AMERICAN ARTISAN

WARM AIR HEATING • AIR CONDITIONING
SHEET METAL CONTRACTING

ESTABLISHED
8 8 0

FEBRUARY
1936

THE AIR CONDITIONING SECTION

Page 23

You don't need to hold up production for

REG. U.S. PAT. OFF.
TONCAN
COPPER
MO·LYB·DEN·UM
IRON

There's a distributor near you-

No consistent user of Toncan Iron ever doubts its ability to resist rust. Non-users, after a trial, are soon convinced. For the benefit of both, we print a list of distributors who are in a position to make delivery from stock or on very short notice.

ALABAMA
Birmingham.....Arnold Supply Co.

CALIFORNIA
Los Angeles.....Ducommun Corporation
Los Angeles.....Union Hardware & Metal Co.
San Francisco.....Ducommun Corporation

COLORADO
Denver.....Goldberg Brothers

CONNECTICUT
Bridgeport.....Parsons Brothers
Hartford.....L. L. Ensworth & Son, Inc.
New Britain.....New Britain Plbg. Supply Co.
New Haven..New Haven Plumbing & Supply Co.
Waterbury.....Henry Weyand Company, Inc.

FLORIDA
Jacksonville.....J. G. Christopher Company
Miami.....Railey-Milam, Inc.
Tampa.....Eagle Rfg. & Art Metal Works
W. Palm Beach....Rfg. & Sheet Metal Supply Co.

GEORGIA
Atlanta.....J. M. Tull Metal & Supply Co.
Savannah.....Atlantic Roofing & Supply Co.

ILLINOIS
Aurora.....Messenger & Parks Mfg. Co.
Chicago.....Barnes Metal Products Co.
Chicago.....Chicago Steel Service Co.

INDIANA
Evansville....Ohio Valley Hdwe. & Roofing Co.
Indianapolis.....Tanner & Company

IOWA
Des Moines.....Iowa Steel Warehouse Co.
Ottumwa.....Haw Hardware Company

KENTUCKY
Louisville.....Stratton & Terstegge Co.

LOUISIANA
New Orleans.....J. Wilton Jones Company

MAINE
Bangor.....N. H. Bragg & Sons
Lewiston.....Hall & Knight Hdw. Co.

MARYLAND
Baltimore.....Wm. A. Conway

MASSACHUSETTS
Boston.....Avery & Saul Company
Boston.....Arthur C. Harvey Company
Boston.....Herrick Company
Boston.....Joseph T. Ryerson & Son, Inc.
Cambridge.....Austin-Hastings Co.
Cambridge.....Lamb & Ritchie Company
Greenfield.....Aird-Don Company
Springfield.....Chas. C. Lewis Company
Springfield.....Chas. Millar & Son Company
Worcester.....Merrill & Usher Company

MICHIGAN
Bay City.....Jennison Hardware Co.
Detroit.....Buhl Sons Company
Detroit.....R. C. Mahon Company
Grand Rapids.....Behlcr-Young Company

MINNESOTA
St. Paul.....Paper-Calmenson Company

MISSOURI
Kansas City....Townley Metal & Hardware Co.
St. Louis.....Central Steel & Iron Co.
St. Louis.....F. Tiemann Stove & Hdwe. Co.

NEBRASKA
Omaha.....Gate City Iron Works

NEW JERSEY
Jersey City....N. Y. Iron Rfg. & Corrugating Co.
Newark.....Dunphey-Smith Company
Trenton.....Trenton S-M Supply House

NEW YORK
Albany.....Aird-Don Company
Binghamton.....Binghamton Hardware Co.
Binghamton.....Chas. Millar & Son Company
Brooklyn.....Atlas Supply Co.
Brooklyn.....Brev & Bieler
Brooklyn.....K. & S. Metal Supply, Inc.
Brooklyn.....Sheet Metal Mfg. Co., Inc.
Buffalo.....Beals, McCarthy & Rogers, Inc.
New York.....Canton Steel Ceiling Co.
Plattsburg.....Aird-Don Company
Rochester.....W. A. Case & Son Mfg. Co.
Syracuse.....W. A. Case & Son Mfg. Co.
Troy.....J. M. Warren & Company
Utica.....Chas. Millar & Son Company
Watertown.....Hunting Supply Corporation

OHIO
Canton.....Berger Manufacturing Co.
Canton.....Milcor Steel Company
Cincinnati.....Ferdinand Dieckmann Company
Cincinnati.....Moise Steel Company of Ohio
Cleveland.....Betz-Pierce Company
Cleveland.....Decker-Reichert Steel Co.
Cleveland.....J. Kinsner & Son Company
Columbus.....Palmer-Donavin Mfg. Co.
Dover.....Reeves Mfg. Company
Tiffin.....Tiffin Art Metal Company
Toledo.....Bostwick-Braun Company

OREGON
Portland.....J. E. Haseltine & Company

PENNSYLVANIA
Easton.....H. P. Kinsey
Erie.....Erie Concrete & Steel Sup. Co.
Philadelphia.....Berger Brothers Company
Philadelphia.....Carter-Donlevy Company
Philadelphia.....Fable & Co., Inc.
Philadelphia.....Hall & Carpenter
Philadelphia.....Hyatt & Company
Philadelphia.....B. P. Obdyke, Inc.
Philadelphia.....W. F. Potts, Son & Company
Pittsburgh.....Steel Products Co.

RHODE ISLAND
Providence.....M. N. Cartier & Sons Co.

TENNESSEE
Chattanooga.....Roofing & Supply Company
Nashville.....T. L. Herbert & Sons

TEXAS
Dallas.....New Process Rfg. & Supply Co.
San Antonio...San Antonio Mach. & Supply Co.

UTAH
Salt Lake City...Zion's Co-Operative Merc. Inst.

VERMONT
Burlington.....Blodgett Supply Company
St. Johnsbury.....Chas. Millar & Son Company

VIRGINIA
Lynchburg.....N. B. Handy Company
Norfolk.....Tidewater Supply Company
Roanoke.....Dominion Metal & Culvert Corp.
Richmond.....Southern Railway Supply Co.

WASHINGTON
Seattle.....Seattle Hardware Co.

WISCONSIN
Green Bay.....Morley-Murphy Co.
La Crosse.....Badger Corrugating Co.
Milwaukee.....Gibbs Steel Company

Republic Steel CORPORATION

REPUBLIC STEEL

GENERAL OFFICES · · · CLEVELAND, OHIO

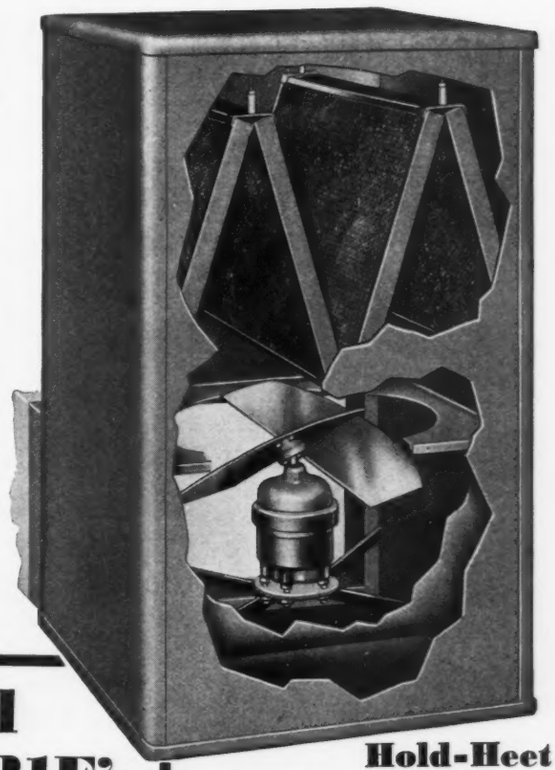
When writing Republic Steel Corporation for further information, please address Department AA.

You too can sell these Furnace Blowers in volume -- *once you get started*

Hold-Heet is today selling as many furnace-blower units as any other manufacturer in this country; and yet this business all comes from dealers who handle from one to two dozen or more in a season. Once a dealer has a sample unit to display, it does not take him long to "go to town." The Hold-Heet unit is such a splendid piece of equipment, so large and adequate in capacity and so outstanding in performance, that sales quickly multiply as soon as you have a sample you can demonstrate and thus show your customers the outstanding value they can obtain for so little money.

Easy to Sell -- *Every Furnace Needs a Blower*

to insure most efficient, satisfactory operation under all conditions. Every home owner is now paying for such equipment whether he enjoys its advantage or not. The University of Ill. research data states the efficiency of any furnace may be increased at least 25% by the use of a suitable blower. Not only will there be substantial fuel economies, but the University data further shows that the capacity of any furnace may be increased at least 30% by the installation of a suitable forced air unit. This means that countless existing inadequate installations will have adequate heating capacity when the Hold-Heet Blower-Filter Unit is installed.



Sold 20 B1F's since August

THE THOS.
MERRYWEATHER
COMPANY
1048 BANK STREET AKRON, OHIO

December 19, 1935

Russell Electric Company
340 West Huron Street
Chicago, Illinois

Gentlemen:

After a great deal of hesitancy we finally decided about three months ago to place one of your No. 3 Hold-Heet Air Conditioning Units in stock. When it arrived we discovered it was such a good looking piece of equipment that we placed it in our showroom. It was only a couple of days until a sale was made and our biggest surprise came when we discovered how it actually performed on the job.

Since the first sale many more followed and we now have quite a few No. 3 Hold-Heet Units installed in connection with both coal and gas fired warm air furnaces and in various sizes and types of new and old homes.

We believe it is the finest piece of equipment available on the market today.

Yours very truly,

THE THOS. MERRYWEATHER COMPANY
Secretary

MERRYWEATHER FURNACES : WARM AIR HEATING EQUIPMENT

Hold-Heet B1F Blower Filter Unit (*Formerly Catalog No. ACA-1*)

This unit is supplied complete—assembled in 28"x31"x52" heavy rigid steel cabinet with attractive grey enamel finish. ½ h. p. Ballentine Capacitor Motor with direct-connected 23 in. Planoidal Blower, 20x30 in. Hold-Heet Filters, Hold-Heet rod and tube-type Fan Switch, Control Box with 100-speed control — List Price F. O. B. Chicago **$84.25**

No Engineering Required--

Installations are Simple

If you are not afraid to tackle a gravity furnace installation in a new five room bungalow, you need never hesitate to undertake the installation of a Hold-Heet Blower-Filter Unit No. B1F in **any old gravity installation** that is heated after a fashion with a furnace having a fire pot of from 18 in. to 28 in. **diameter, inclusive.** Simply cut a hole in the top of the cabinet for the cold air return (the same area as the present return)—build a boot for connecting to the furnace with area or opening equal to total area of warm air leader pipes. Full instructions are supplied. There is no sub-base or hood to build—the unit comes completely assembled. No canvas connections are required as the power unit is completely sound insulated in flexible rubber. After installation, damper down the various duct dampers to balance delivery between the various rooms as required and adjust the 100-speed control to the volume of output you require. There is plenty of reserve power and capacity—it is very rarely that you require the maximum output of the unit.

On New Small Duct Forced Air Jobs, Follow These Figures

Firepot Diameter	*Min. Warm Air Leader Pipe Area*	*Min. Cold Air Return Area*
18 in.	200 sq. in.	150 sq. in.
20 in.	250 sq. in.	200 sq. in.
22 in.	300 sq. in.	250 sq. in.
24 in.	350 sq. in.	300 sq. in.
26 in.	450 sq. in.	375 sq. in.

Seeing is Believing

You can't do business without a sample. Merryweather did not sell a single unit until he had a demonstrator. Den Besten in Chicago, quickly sold 30 units where he had worked for months to get a single sale before he put in a demonstrator. Waldie, in Mount Kisco, New York, made a new sales record as soon as he had a demonstrating installation (see feature story in October Issue, Sheet Metal Worker). You, too, can hang up a new sales record and make more money than you ever thought possible in the furnace business, but you have got to have a sample unit to show. Order your sample today through your regular jobber. Don't pass up these big profits—Act now.

For complete information or service on Hold-Heet, address territorial distributor.

Exclusive Distributors for East, Southeast and Export
MELCHIOR, ARMSTRONG, DESSAU CO., 300 Fourth Ave., New York
Branch Warehouses—Boston, Brooklyn, Rochester, Philadelphia, Harrisburg, Baltimore

Exclusive Western Distributors
MONTGOMERY BROTHERS, 61 Fremont Street, San Francisco
Branch Warehouses—Los Angeles, Seattle, Portland

Exclusive Northwestern Distributors
KELLEY-HOW-THOMSON CO., 309 South 5th Avenue, West, Duluth
Branch Warehouse—Butte, Montana

RUSSELL ELECTRIC COMPANY, *Mfrs.*
342 West Huron Street Chicago

In This Issue

We would like to publish a complete report of all the remarkable things there were to see at the Fourth International Heating and Ventilating Exposition, but such is physically impossible. We do relate some of the high lights on page 11 for those who couldn't attend.

*

As welding becomes more and more an everyday procedure, contractors will want to know how other firms handle certain difficult problems. On page 13, J. H. Blaha gives some really practical methods for welding light gage steel where perfect welds are necessary.

*

This year's N. W. A. H. & A. C. Ass'n meeting was the biggest meeting yet held. The program was quite in keeping with the record attendance. The report of the principal addresses appears on page 17.

*

Our series on Better Weather Protection continues on page 20. We discuss copings, that insidious source of water penetration, and show some accepted methods for keeping water out of parapets.

*

Ever hear of brick soaps? An example of their use is related in the Hiram College article on page 22.

*

This issue also carries reports of the Indiana state convention (page 55) and the Wisconsin Meeting (page 61). The important addresses and discussions are reported in as much detail as possible.

*

This month's Problem Corner presents a practical solution to that frequent problem of controlling humidity in garages heated by forced, humidified air. Also some other problems.

*

We take pleasure in publishing the first of an important series covering the engineering involved in "Converting Old Gravity Plants to Forced Air." See page 29. The author, G. A. Voorhees, needs no introduction.

*

S. Konzo continues his "Forced Air Heating Facts From the Research Residence" on page 32. He gives some timely and pertinent facts on the subject of filters and how to select and service them.

*

Many comments have been received on O. J. Kuenhold's article in January on "Humidification." We have persuaded Mr. Kuenhold to continue. On page 34 he begins discussion of how to determine the size of a humidifier and the amount of water it must evaporate.

AMERICAN ARTISAN

With which is merged

FURNACES AND SHEET METALS AND Warm-Air Heating

Covering All Activities in

Gravity Warm Air Heating — Forced Warm Air Heating
Sheet Metal Contracting — Ventilating
Air Conditioning

J. D. Wilder, Editor

Vol. 105 No. 2 — February, 1936 — Founded 1880

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More than 7,000 Copies of this Issue are being distributed

19 MILLION SUNBEAM ADVERTISING MESSAGES IN 1936!

The magazines, Time, Better Homes & Gardens, The American Home, Architectural Forum and American Builder will carry Sunbeam advertising to millions of prospects.

The Sunbeam Air Conditioning Unit

SUNBEAM advertising will reach millions of home owners, home builders, home buyers, architects, building contractors, realtors and other choice prospects in 1936!

Every month for the balance of this year large dominating advertisements—full page and ⅔ page ads—will appear in such publications as Time; Better Homes & Gardens; The American Home; Architectural Forum; and American Builder. As a result of this publicity, a definite demand and preference for Sunbeam Air Conditioning—"heats in winter, cools in summer"—is being established among thousands of individuals who can afford and who will buy air conditioning equipment this year.

This national advertising program is only one of the several features which justify the Sunbeam keynote of "Easier to Sell in 1936!"

New low prices now place Sunbeam Warm Air Furnaces and Air Conditioning equipment within the reach of many thousands of prospective purchasers. You need ask no premium for the high quality of these products.

Attractive appearance is an important factor in the sale of automobiles, radios, refrigerators—and air conditioning units for new or modernized homes. Sunbeam Air Conditioners are without equal in handsome appearance.

The F.H.A. Finance Plan . . . six types of warm air furnaces, cast iron and steel, pipe and pipeless, for all fuels, coal, oil and gas . . . these are additional reasons why Sunbeams are easier to sell.

The coupon will bring you a story of interesting sales and profit possibilities with the Sunbeam line. Fill it in and return it today.

SUNBEAM
WARM AIR FURNACES AND AIR CONDITIONING UNITS

THE FOX FURNACE COMPANY

A Division of American Radiator & Standard Sanitary Corporation

ELYRIA, OHIO

THE FOX FURNACE COMPANY
ELYRIA, OHIO

We are interested in a line of furnace and air conditioning equipment that will enable us to compete successfully for the larger volume of business that promises to be available this year. Please send complete details to

Name .....

Address .....

City and State.....A-2

THE GUARANTEED PEERLESS

NEW HEAVY-DUTY "A" SERIES FURNACE

★

TEN YEAR GUARANTEE

The Peerless Foundry Company, Incorporated under the laws of Indiana, guarantees to REPLACE FREE OF CHARGE f. o. b. Indianapolis, any part of the Peerless Heavy Duty "A" Series Boiler Plate Furnace (grates and linings excepted) if it wears out within ten years from date of purchase.

This Peerless Heavy Duty "A" Series Furnace incorporates all the outstanding Peerless features . . . the Three Flue Radiator with Brick Arch that eliminates warping . . . Duplex Grate on case hardened ball bearings for easy operation and long life . . . Automatic Damper Control . . . Down Draft Combustion which supplies preheated air to the fire when the drafts are open, eliminating the possibility of a dirty, sooty fire. These are some of the outstanding points, there are many more, and they all combine to do a very fine job of selling for you . . . investigate them.

This exceptional furnace has developed and *sold* a tremendous amount of new furnace business for its dealers during the past year. Peerless dealers have profited by this business.

Peerless always endeavors to produce the type of merchandise that is highly salable . . . that will keep its dealers a stride ahead of the field . . . that assure profits.

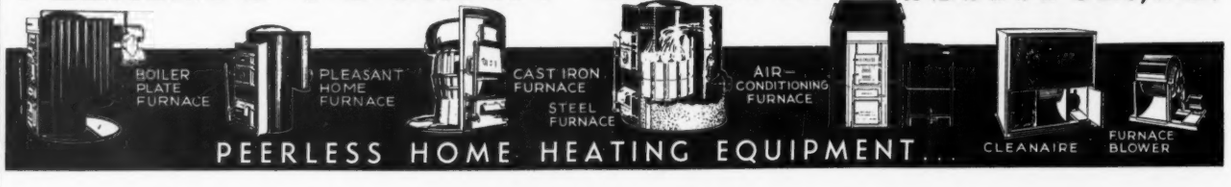
Investigate your possibilities as a Peerless dealer . . . NOW.

All Peerless products may be purchased on convenient credit terms . . . 3 years to pay.

WE DO NOT SOLICIT OR SELL TO MAIL ORDER HOUSES

PEERLESS FOUNDRY COMPANY

1853 LUDLOW AVE.
INDIANAPOLIS, IND.



PEERLESS HOME HEATING EQUIPMENT...

NOW FURNISHED IN SHEET FORM
CAN BE CUT, BENT OR FORMED
AVAILABLE THROUGH REVERE
DISTRIBUTORS EVERYWHERE

Cheney Flashing is the time-tested through-wall copper flashing familiar to architects everywhere. It scientifically solves drainage and seepage problems in masonry walls. It prevents leaks, streaks, and stains which disfigure the appearance of a building; and also prevents rusting of steel spandrels and lintels.

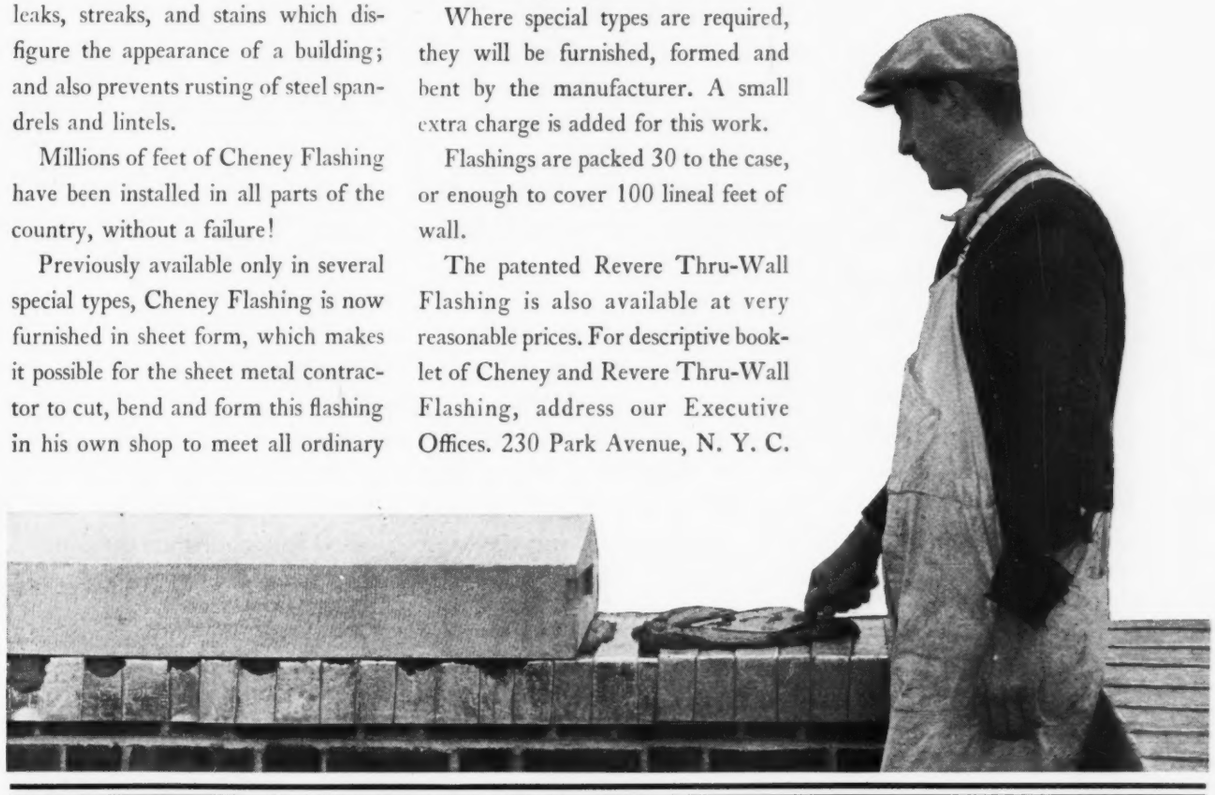
Millions of feet of Cheney Flashing have been installed in all parts of the country, without a failure!

Previously available only in several special types, Cheney Flashing is now furnished in sheet form, which makes it possible for the sheet metal contractor to cut, bend and form this flashing in his own shop to meet all ordinary flashing requirements. Standard sizes of the flashing sheets are as follows: all widths from 6 to 60 inches (even widths only), and lengths of 42 inches. When laid up, they measure 40 inches.

Where special types are required, they will be furnished, formed and bent by the manufacturer. A small extra charge is added for this work.

Flashings are packed 30 to the case, or enough to cover 100 lineal feet of wall.

The patented Revere Thru-Wall Flashing is also available at very reasonable prices. For descriptive booklet of Cheney and Revere Thru-Wall Flashing, address our Executive Offices. 230 Park Avenue, N. Y. C.



Revere Copper *and* Brass

INCORPORATED

FOUNDED BY PAUL REVERE 1801

EXECUTIVE OFFICES: 230 PARK AVENUE, NEW YORK CITY · MILLS: BALTIMORE, MD. · TAUNTON, MASS.
NEW BEDFORD, MASS. · ROME, N. Y. · DETROIT, MICH. · CHICAGO, ILL. · SALES OFFICES IN PRINCIPAL CITIES

OF VITAL INTEREST TO ADVERTISERS

Only one publication serving this field of warm air heating, sheet metal contracting and residential air conditioning offers the clear, complete, and *indisputable* facts about its circulation which advertisers have the right to expect and should demand —those contained in an A. B. C. report.

That publication is AMERICAN ARTISAN.

Every year AMERICAN ARTISAN'S circulation records are audited by an outside agency—the Audit Bureau of Circulations.* This Bureau, after making a thorough examination of records requiring from one to two weeks' time, issues an audit report—available for anyone—in which all facts having a bearing on circulation values are clearly set forth. From this report, advertisers may learn at a glance:

1. Exactly how many PAID subscribers AMERICAN ARTISAN has.
2. What the business classification of each subscriber is.
3. Where the subscribers are located.
4. By what methods these subscribers are obtained.

AMERICAN ARTISAN is the only journal in this field which can provide advertisers with this accepted PROOF that it reaches as many PAID subscribers as it claims to reach. It is the only paper in this field which offers advertisers A.B.C. VERIFIED information concerning the number of its PAID subscribers, their classifications by occupation, their location, and the methods used to obtain their subscriptions.

Take guess work and money wastes out of media selection by consulting A.B.C. reports before contracting for space. Write to AMERICAN ARTISAN or to the Audit Bureau of Circulations, 175 W. Wacker Drive, Chicago, for the latest audit report on AMERICAN ARTISAN circulation.

* The Audit Bureau of Circulations is a cooperative, non-profit making organization whose membership includes more than 90% of all publications issued in the United States and Canada. Its sole business is to collect and verify information on the paid circulation of the publications issued by its publisher members, and to disseminate that information in the form of standardized reports. Only publications whose circulations measure up to the rigid standards of paid circulation set up by the Bureau are eligible for membership. AMERICAN ARTISAN has been an A.B.C. member for many years.

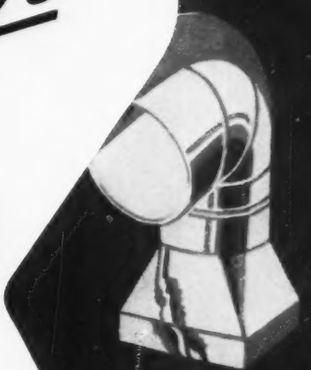
KITCHEN EQUIPMENT

PORTABLE BARS

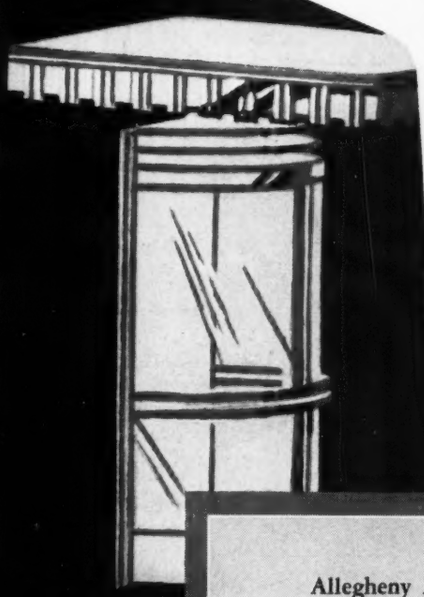
STOVE PIPE

You can make it Better with ALLEGHENY METAL

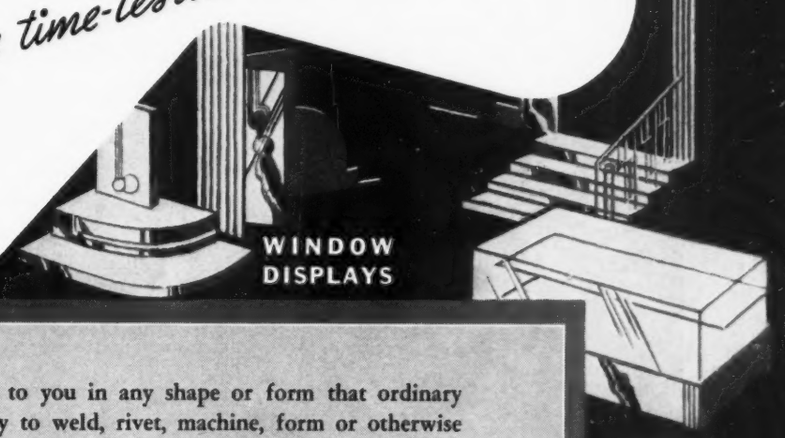
The time-tested stainless steel



VENTILATORS



ENTRANCES



WINDOW DISPLAYS

STORE EQUIPMENT

Allegheny Metal is available to you in any shape or form that ordinary metals can assume. It is easy to weld, rivet, machine, form or otherwise work; you can put it to any use where you now employ lesser metals. *And gain immeasurably thereby!*

This time-tested stainless steel doubles the strength of your product, or halves the weight with equal strength. It multiplies the beauty, life and wear-resistance a hundredfold. It requires no painting or plating; needs only soap and water to stay bright and new; remains untouched by all normal forms of corrosion. ● Allegheny Metal adds *the qualities that sell!* Specify and use it wherever possible; our assistance is always at your disposal.

ALWAYS YOUR BEST STAINLESS STEEL SPECIFICATION

Allegheny METAL CONTROLS CORROSION THE SAFE METAL

ALLEGHENY STEEL COMPANY

BRACKENRIDGE, PA.

Sales Offices and Warehouse Stocks in the Principal Cities

Warehouse Stocks are carried by JOS. T. RYERSON & SON, INC., WAREHOUSES: Union Hardware & Metal Co., Los Angeles . . . American Brass & Copper Co., San Francisco—Oakland

ALLEGHENY PRODUCTS: SHEETS FOR AUTOMOBILE BODIES, METALLIC FURNITURE, DEEP DRAWING, ALLEGHENY METAL, ALLEGHENY STAINLESS STEELS, ELECTRICAL SHEETS, STEEL CASTINGS, SEAMLESS TUBING, BOILER TUBES, PIPE

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The NEWPORT ROLLING MILL CO.

IRON AND STEEL SHEETS

GOHI is pure iron alloyed with the right amount of copper to give maximum resistance to wear, weather and corrosion. Proved through a quarter century of service to be the longest-lasting, low-cost ferrous metal. Produced exclusively by The Newport Rolling Mill Co., Newport, Kentucky.

TO select the right sheet metal is no longer a process of trial and error, guess or experiment. Today you may safely and profitably depend on one source of supply for iron and steel sheets of the exact quality any job may require. The resources of The Newport Rolling Mill Company make instantly available GLOBE BRAND Sheets for those who want a dependable grade of steel at a low price; KENTUCKY Copper-Bearing Steel for those requiring a higher quality than commercial steel; GOHI Pure Iron-Copper Alloy for those demanding a sheet metal that will give unfailing service and satisfaction under the most difficult conditions. Each of these metals is produced by the same organization; to exacting standards of quality and uniformity. Each is outstanding in its class and represents superlative sheet metal value. Samples and full details of these metals on request.

The NEWPORT ROLLING MILL CO.
NEWPORT, KENTUCKY.
Since 1891 Producers of High Grade Iron and Steel Sheets

AMERICAN ARTISAN

Volume 105 Number 2

As We Saw the Exposition

THAT the air conditioning industry is, indeed, well on its way toward "our next big business" was emphatically shown at the Fourth International Heating and Ventilating Exposition in Chicago January 27 to 31 when nearly 30,000 members in the industry registered and probably 50,000 citizens came to see what air conditioning is all about.

The 30,000 members registered (as shown by their cards) included dealers and contractors from practically every state, executives from manufacturers of all kinds and sizes, engineers from all over the world.

◆

Very encouraging to the 300 exhibitors was the intelligent interest shown by the visitors. Practically every display had its space filled with men who wanted intimate data on the apparatus and its applications. Where working units or models were shown, visitors often stood in line for long periods to put the products through their paces or ask questions.

Encouraging, too, was the fact that visitors did not restrict their attention to just a few products or to familiar apparatus — they wanted full information on products they have not used but expect to. Heating men wanted data on cooling. Forced air specialists wanted specifications of boiler-air conditioning units. Everyone wanted data on fans, controls, oil burners, stokers, furnaces, compressors and so forth.

◆

One of the things which impressed us greatly was the large share of space devoted to residential air conditioning. Whereas previous shows had as much or more commercial and industrial apparatus, this show covered residential systems and apparatus in an impressive manner. By actual count there was more apparatus for domestic application than for large work.

◆

Important, too, was the predominance of warm air heating or direct-fired apparatus. Manufacturers of long standing in the furnace field were supported by new companies or by well known manufacturers just getting into the direct-fired field.

◆

One of the impressive features was the large number of furnace-burner units in the show. In most cases these units were displayed by the burner manufacturer. According to our count there were 19 burner-furnace units in the show, of which 12 were shown by the burner manufacturer and seven by the furnace manufacturer. In addition, there were at least eight boiler-burner units, a few gas furnaces and a few furnace-stoker assemblies.

It would be hasty judgment, we think, to assert that this showing of furnace-burner units proves that automatic firing by a packaged unit is going to dominate the heating field. The showing does indicate, we think, that these manufacturers who are accustomed to aggressive merchandising now have the apparatus and some semblance of dealer distribution and need only experience in actual heating design and installation. It will be interesting to see how these manufacturers solve the installation problem.

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It did seem to us that some of the furnace-burner units showed little originality and gave the impression in some cases where we asked questions that the manufacturer had made up the unit because his competitor had a system like it.

◆

For one thing we must give these furnace-burner, boiler-burner, gas furnace manufacturers credit. Without exception the units were saturated with eye appeal. Bright colored casings, bright metal trim, excellent lines and compactness, everything concealed and assemblies of quality control apparatus were the rule and not the exception. Any home owner approached by one of these manufacturers will find it hard to resist such eye appeal after so many years of bare galvanized iron and unsightly size.

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In connection with this matter of eye appeal we were impressed with the general tendency to place the firing device within the casing and to make the blower-filter section symmetrical with the furnace casing. Many of the units continued the furnace casing over the blower, making the whole continuous in appearance; in others the blower cabinet was made a part of the furnace and not a gadget trailing along behind.

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Some visitors professed to see in the exposition a predominating interest in cooling, but we were not so impressed. By actual ob-

servation of the visitors it seemed to us that the public and the contractors showed more interest in winter air conditioning. Listening to visitors in several booths gave the impression that the public is just a little wary of cooling as indicated by the practically universal first question—"How much does it cost to buy and operate?"

On the other hand listening to the trade and to the public in booths showing winter air conditioning demonstrated that the public wanted to know how these devices could be applied to their existing systems, just how cleaning, humidification, circulation are secured; what advantages these bring; how winter conditioning improves health, sanitation, comfort. We were surprised at the number of times some citizen wanted to know how to cure cold rooms, drafts, cold walls, etc.

◆

One of the satisfying things to us was the interest in the accessories. Contractors wanted data (not guesses) on the performance of apparatus; they wanted suggestions on how to improve their present practice. For example in controls, the more elaborate systems of zone operation, combined temperature and humidity, control of effective temperature drew continuous questioning. Manufacturers of fans, filters, humidifiers, coils, compressors, universally expressed surprise and satisfaction over the intelligent interest and evident desire to give the buyer a better installation.

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Insulation proved to be one of the surprises of the show. The dozen or so displayers were kept on the jump every day by persons who wanted to know how effective is insulation in the walls of an old house; whether attic floor insulation is more effective than attic roof rafter application; whether fill type, bat type, rigid type is easier to apply and more efficient, more lasting. Contractors wanted to know the requirements for operating as an insulation installer. Engineers demanded complete data on reduction in heat loss factors with insulation and recommended application specifications. So far as the public was concerned one manufacturer declared he thought every home owner in Chicago went away with literature.

◆

It was a practical show. Working demonstrations played to packed booths. How to do it; how to install it; how to design it; was very much in the forefront. It might be remarked, in passing, that there must have been a lot of plumbers attending because the booths showing pipe threaders, brass pipe assembly, etc., did a rushing business.

◆

Manufacturers of sheet materials were present with really remarkable displays. Actual models of rolling mills; practical demonstrations of proper methods of forming and fabricating with special metals; actual models and even full sized arrangements of metal application such as duct work to show good and bad practice; items fabricated from sheet material not familiar to every contractor—did a real job of focusing attention on this highly important phase of air conditioning.

◆

A report would not be complete without some word on those special attention attracters which crowded some booths far beyond capacity. One control manufacturer had a model of a complete air conditioning system which the visitor could put through its paces and see just what actually happens; a motor in a glass case flooded with streams of water had visitors looking behind, under and all around; a model room which the visitor could heat, cool, humidify, dehumidify at will by pressing buttons nearly wore out the buttons; these are some indications of the extent to which manufacturers went to make their displays interesting and profitable.

◆

And, as a last impression — crowds and crowds of people. Crowds which swirled and eddied and broke to flow down aisles, through booths, filling every available inch of space and making traffic impossible for quarter hour periods. And tired feet. Tired feet on women ——of which there were surprisingly few during the daytime, but thousands at night when the public was admitted. Tired feet on men who had tramped religiously up and down in order to overlook no item in a great show. People with feet so tired that they sat on anyone's chair and cared not what went on around them.

Of course there were the literature hounds. Especially at night when young men and old ladies took one of each of everything offered without having, we are positive, the slightest comprehension of what the literature was all about. They stuffed pockets, carried bundles and bales, filled paper sacks,—they took cheap little leaflets and very expensive broucheres without preference until one wondered what possible use they had for such a self imposed reading spree. Those in the booths talked themselves hoarse, got so tired from standing hours on end answering questions that bed was a welcome relief.

◆

Elsewhere in this issue is a report of the meetings of the National Warm Air Heating and Air Conditioning Association and its joint meeting with the A. S. H. V. E. It was a big week——probably the biggest week our industry has yet witnessed. But, also, it is only partial evidence, we think, of the future which this industry can safely anticipate.

Minimizing Welding Distortion In Light Gage Steel*

By J. H. Blaha
Chief Engineer
General Household Utilities Co.

THIS topic deals with some of the methods used to minimize distortion in 20- and 22-gage steels. To illustrate the principles involved, I have chosen an article we produce. This is a butt-welded food liner which is porcelained and used inside of electric refrigerators. It is made of 20-gage steel with top and bottom welded to the sides and back butted and welded. (See Fig. 1.)

Note the smoothness of the weld which is very essential for porcelain and also the discoloration showing the distance the heat has traveled on either side of the butt joint. The weld as we see it here has not been touched up by grinding, but is left just as it comes from the welder. A butt weld in thin sheet metal is probably the hardest kind of weld to make, since the inside and outside must line up evenly. Therefore, the parts must be uniform in size and the welding jigs made to properly hold the work, in order to obtain satisfactory results.

Making the Butt Welds

In Fig. 2 we see parts of food liner set up in the welding jig, closely held together and the joints flush on the inside and outside, ready for the welder to begin operation. The welder must have a steady hand to make this type of butt weld as he is not permitted to use any welding rod. This would cause high spots, which would necessitate grinding.

Grinding of welds is quite objectionable for work which must be porcelained, because by grinding, pinholes appear which cannot be covered with porcelain. Pickling acid remains in them and bubbles out through the ground coat finish. Another objectionable feature is burnt metal which becomes porous when put through pickling acid causing pinholes to appear. Scale, caused by welding, especially when heavy, is hard to remove in the pickling bath, and the welder is cautioned to see that he keeps his torch properly adjusted to eliminate it as much as possible.

The welder also must keep the proper angle of flame against the metal (see Fig. 2) in order not to burn holes through it. The slightest hesitation on his part likewise is apt to cause burning through the light steel. A slight swirling motion is maintained on the torch to keep the molten puddle of metal crossing over the butt joint, thus fusing the two parts together, and leaving a smooth surface on the inside of the weld as was shown in Fig. 1.

Since work which has to be porcelained requires a pure iron with a carbon content 0.02 to 0.04 per cent maximum, no welding rod which contains appreciable carbon can be used. We therefore shear ⅛-inch wide strips from the same material of which the parts are made and use these strips instead, but only on corners where a small portion must be fused in to fill the gap. This gap is due to the springing back of the metal on the tops and bottoms when the heat from the torch relieves the strains in the metal which are set up in the part in the drawing operations in the pressroom.

Requirements for Welders

We have found that the average experienced welder, who may be an expert on welding of heavier gage steels, finds himself at first lost, when he comes to welding light gage steels. In about 75 per cent of the cases, we have been compelled to take these new men and put them through our welding school for a period of from two to three weeks, so that they could adapt themselves to the welding of light gage steel, before putting them on our production work.

In this course we keep a trained man, who follows these welders, instructing them how to adjust their torches, the size tip and gas pressure to use, the angle and distance the flame must be in relation to the work, the swirling motion they must attain to produce a perfect butt weld, how to keep the molten puddle flowing across the joint and all the other little points which they should watch out for. Nevertheless, in some cases, it has been found im-

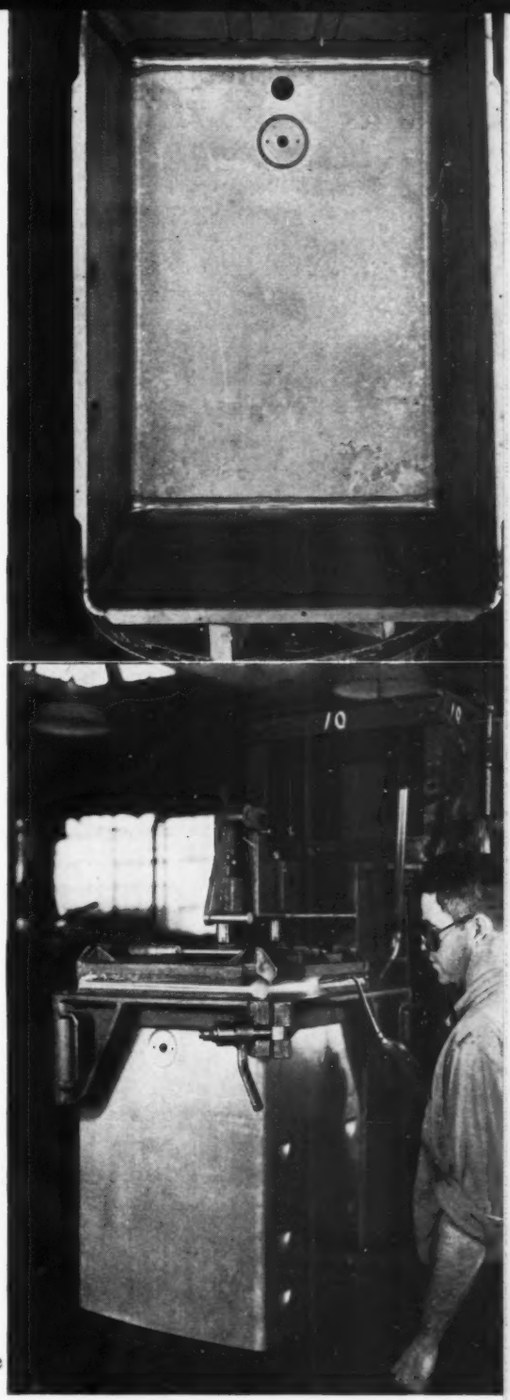


Fig. 1—Butt Welded Food Liner for Refrigerators

Fg. 2—Food Liner Being Welded Held in Jig

*Presented at the 15th Fall Meeting of the American Welding Society, Chicago, Illinois, October 2, 1935, and published in The Welding Journal for November, 1935.

Fig. 3—Welding Jig for Food Liner with Butt Welds

possible to adapt these experienced welders to the welding of light gage steel.

A good welder is practically 50 per cent of the battle toward turning out a good product. He either turns out a good job or he turns out a job with a weld having excess metal, which must be ground down to the thickness of the metal itself. He also may burn the metal and leave a lot of pinholes, which are hard to fix, or he may make a badly distorted weld, which may cause the whole food liner to be scrapped, as a distorted weld shows up very badly through porcelain.

Welding Jig

However, in any case, the welder must have the proper jig to hold the work, so that he can make a good job and that is the other 50 per cent of the battle. Considerable can be said about welding jigs because if they are not properly designed, the results necessarily will be poor. Since light gage steels cannot withstand the intensive heat produced by the torch flame without warping, it is apparent that this heat must be taken away from the joint in some manner. Otherwise the sheets will be badly distorted and look like the waves and ripples of the ocean. Therefore, the welding jig must be made heavy in order to conduct away this excessive heat, as rapidly as possible, and not allow it to travel through the light gage steel.

In Fig. 3, we see the type of butt welding jig which we are using. Note the massive bulk of cast iron it is made up of. These jigs are made of seasoned cast iron, to prevent them from warping. The top with the cam action is used for bringing the part down firmly against the expanding blocks and also to contact and tension the liner top against the back and sides to be welded. The side clamps here are used to hold the back and sides in place and have surface contact to take away the excessive heat traveling down the thin sides and back. A cam screw draws the clamps together, bringing the back and sides in contact with the expanding blocks below.

When the parts are set and the welding jig locked, the parts line up at the joints and do not overlap. They are then ready for the welder to begin the welding operation, starting at the extreme right-hand end, facing the jig, and coming around to the opposite end with as few stops as is possible. The "V" groove or slot which is located midway between the butt joint (see Fig. 4) is approximately $\frac{3}{8}$ inch across. This is kept as narrow as possible, so that the parts come in contact with the cast iron blocks to take away the heat as quickly as possible.

Note the $\frac{3}{16}$-inch slot directly in the center of the "V" groove. This $\frac{3}{16}$-inch slot extends back approximately $1\frac{1}{8}$ inches and at its back there are $\frac{1}{2}$-inch holes drilled vertically on $1\frac{1}{2}$-inch centers along the 3 sides where the welding is done. This $\frac{3}{16}$-inch slot and $\frac{1}{2}$-inch holes permit the excess gases to escape instead of burning up in the "V" groove and causing oxidation and burning of the metal, and at the same time help to keep the jig from heating up too much.

There is approximately a $\frac{3}{4}$-inch space between the top clamp and side clamps when the jig is closed leaving space for the torch flame. These clamps, both side and top, are made heavy also in order to absorb the excess heat and protect the part from the direct flame of the torch.

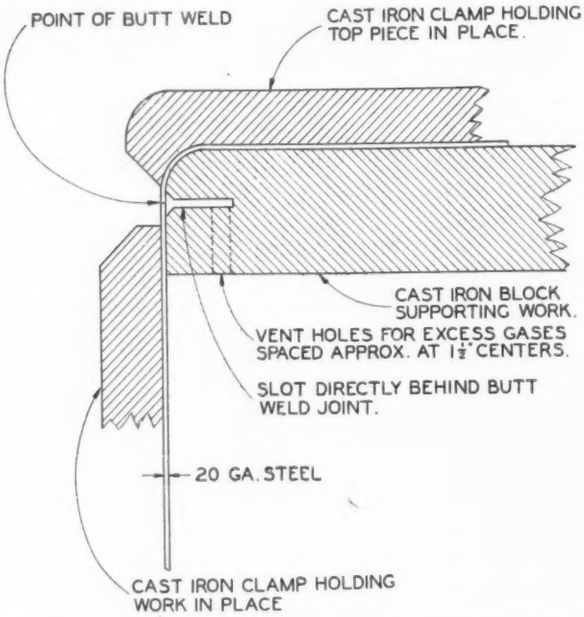

POINT OF BUTT WELD
CAST IRON CLAMP HOLDING TOP PIECE IN PLACE.
CAST IRON BLOCK SUPPORTING WORK.
VENT HOLES FOR EXCESS GASES SPACED APPROX. AT 1½" CENTERS.
SLOT DIRECTLY BEHIND BUTT WELD JOINT.
20 GA. STEEL
CAST IRON CLAMP HOLDING WORK IN PLACE

Fig. 4—Jig Parts for Butt Welds, Showing Venting

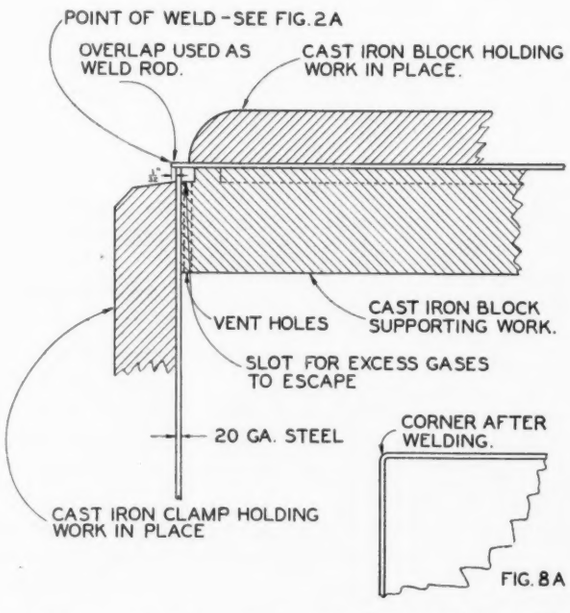

POINT OF WELD - SEE FIG. 2A
OVERLAP USED AS WELD ROD.
CAST IRON BLOCK HOLDING WORK IN PLACE.
VENT HOLES
CAST IRON BLOCK SUPPORTING WORK.
SLOT FOR EXCESS GASES TO ESCAPE
20 GA. STEEL
CORNER AFTER WELDING.
CAST IRON CLAMP HOLDING WORK IN PLACE
FIG. 8A

Fig. 8—Jig parts for square corner welds, showing venting

For heavy work which is to be welded, usually the jigs can be made much lighter as the metal will absorb the heat and it is not necessary to depend on the jig. But it is very important that the correct type of jig is designed for light gage steel welding, that the parts fit and contact, and that the jig is heavy enough to absorb the excessive heat, if distortion in production work is to be minimized.

Periodically these welding jigs must be checked to see if there are any warped parts, and any of the lighter parts which may have become warped must be replaced to retain the good quality of work produced. It may seem that I am stressing a little too strenuously on the problem of welding jigs, but in the experience I have had with the welding of light gage steel, I can only say that it is a very important one and cannot be overlooked, especially on production work where 500 to 1000 food liners have to be made daily.

Welded Square Corner

In Fig. 5 we see a square corner welded food liner, which is used more than the butt-welded type I have just described. Welders prefer this type because it is much easier to make, and they can weld it in 25 to 30 per cent less time than the butt-welded food liner. This type of food liner has approximately $\frac{3}{32}$-inch radius on inside corners and is made by having the flat top piece extend $\frac{1}{32}$ inch beyond the back and sides. This $\frac{1}{32}$-inch overhang of metal serves as filler metal and the operator has not very much trouble in fusing it to make the joint. At all times he has an even amount of metal, which results in a very uniform weld. No grinding is necessary on this type of food liner and there is practically no distortion around weld.

Welding Square Corner

In Fig. 6 we see the top clamp of the welding jig and side clamps holding the parts firmly as in the jig shown previously. The side clamps are close to the point of the weld ready to take away the excessive heat, to prevent the sides and back from becoming distorted. In welding, the operator again starts at the farthest right-hand corner, facing the jig, and welds around to the other end with as few stops as is possible.

It will be readily seen that the butt type weld, as shown previously, is more subject to distortion because of the fact that there is nothing to brace the two edges of metal. In the square corner weld the flat top is resting on the edges of the back and sides under tension, and the torch flame is played on the top edge at about a 45-degree angle, thus fusing the $\frac{1}{32}$-inch overhang of the tip, down to the sides. When there is a slight distortion in this square corner food liner, it is usually on the top edges. This is ordinarily due to the welder not keeping the right angle on his flame.

Jig for Square Corner

In Fig. 7 we see again the heavy cast-iron construction used for welding jig for corner weld which is similar to that used for butt-welding. A $\frac{3}{8}$-inch right-angle groove is provided around the top, instead of the "V" groove, and the gases are vented through holes running vertically. (See Fig. 8.) Otherwise the construction is much the same as the previously mentioned jig. The top clamp works on a cam and the side and back clamps hinge, with a cam screw to draw the part tight against the inside expanding blocks.

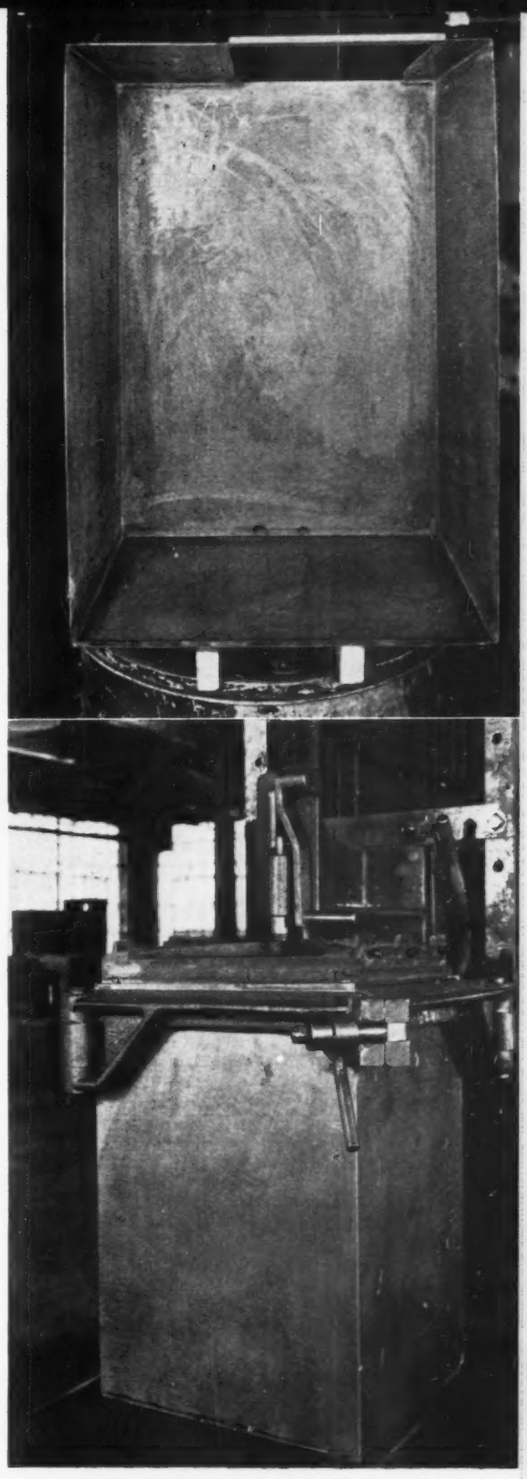


Fig. 5—Square corner welded food liner for refrigerator
Fig. 6—Food liner with square corners held in welding jig

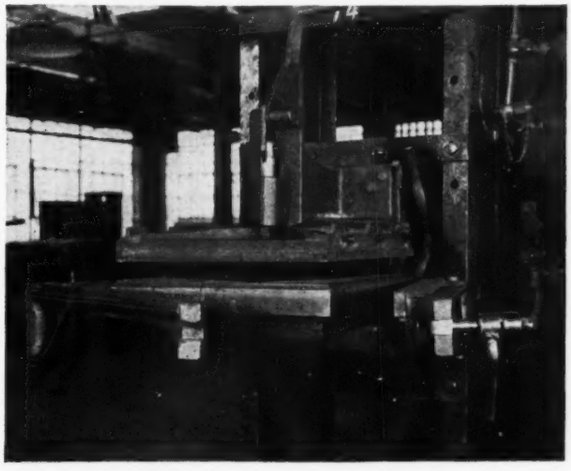


Fig. 7—Welding Jig for Food Liner with Square Corner Welds

Water Cooled Jigs

The welding jigs I have been speaking of are all naturally cooled

(*Continued on page 71*)

A 40-Square Copper Tile Roof

By G. D. Meyers*

The installation of this large residential copper roof was complicated by the overhang of eaves and roofs, but the completed roof has attracted more than local attention.

ROLAND A. WILSON, of 65 Kenilworth Road, Asheville, North Carolina, not long ago built a new home, a house, as shown by the photograph of the exterior, of stone veneer construction, with chimneys of stone set irregularly, as designed by the architect, Charles N. Parker, of Asheville, North Carolina, and erected by C. I. Taylor, General Contractor of Weaverville, North Carolina.

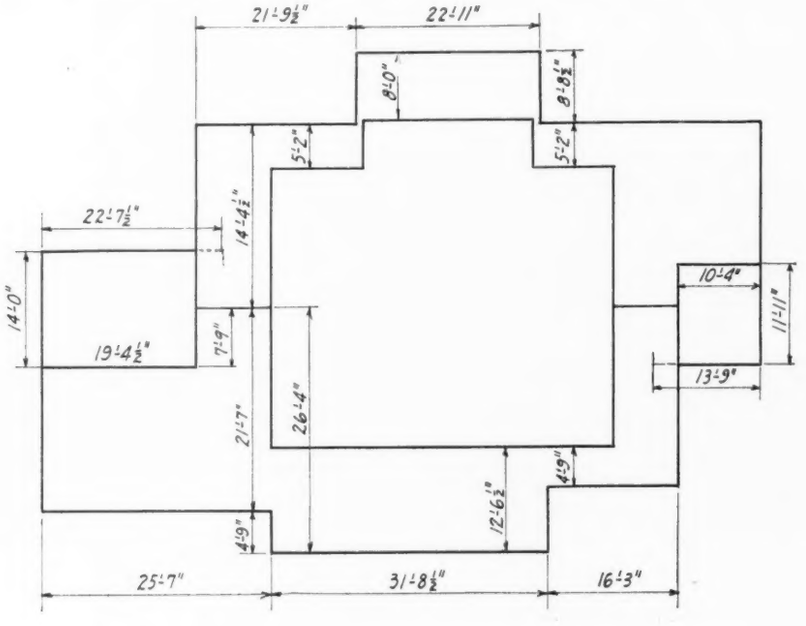
From the sheet metal man's point of view, the most outstanding thing about the house is the copper tile roof which was sold by a local metal products distributer.

Viewing the roof from across the street, the brilliant finish of the copper tile on the front canopy over the drive at the left, over the porch, second floor roof, as well as the side porch, gives to the residence a very unusual and effective appearance. The tile was applied with copper nails throughout, making use of the bungalow type fixtures supplied by the manufacturer. Copper flashing used around the two chimneys was set into and cemented in the stone work. Special cement was used for the placing of these flashings to insure tightness. The tile was laid over composition asphalt shingles which were covered with crushed slate. This insulation, together with the air spaces beneath the tile, is expected to provide a divided insulation effect to save fuel in the winter and to keep the upper floors cooler in the summer.

Some idea of the problems of the architect and the roofing contractor, can be gained from a study of a revised sketch by the architect, which is shown herewith.

This roof cost the owner close to $2,000, and represented a very considerable fraction of the total cost of the house.

*Vice-President, Edwards Manufacturing Co., Cincinnati, Ohio.



The photograph above and the plan to the right show the problem in estimating set up by the overhanging eaves and roofs. There are several roof levels, but by dividing the roof into rectangles the contractor was able to scale off his quantities. The plan shows the final drawing used to get quantities.

The N. W. A. H. & A. C. Ass'n Convention

FEW persons who attended the Twenty-third Annual Convention of the National Warm Air Heating and Air Conditioning Association, January 29-30 at the Stevens Hotel, Chicago, or the Forty-second Annual Meeting of the American Society of Heating and Ventilating Engineers, held the same week at the Palmer House, or who attended the Fourth International Heating and Ventilating Exposition, held January 27-31 inclusive at the new Chicago International Amphitheatre, will doubt that this week was one of the most important weeks in the industry's history.

President's Report

Arrangements were made by the National Warm Air Association and the A.S.H.V.E. to hold their annual meetings at the same time so that visitors could view the exposition. The meeting of the National Warm Air Heating and Air Conditioning Association was probably the largest meeting ever held by the association.

President Richardson opened the Wednesday morning session with an address in which he said: "Last year I stated that there were 135 new manufacturers looking at our industry. This year the number has increased to well over 200 such manufacturers, all of whom are attempting to cash in on the educational programs, on the knowledge and on the activities fostered and carried forward by our association and our industry. . . . It looks as though FHA is safe from Supreme Court curtailment and will be extended beyond April 1, 1936. . . . I admonished you a year ago to take greater advantage of FHA. May I again urge you to take even more advantage this year than you did last. . . . We must recognize and be ready to fight fiercer competition. . . . New organizations give scant attention to the contractors and jobbers in our field. Their distribution is through high pressure salesmen, local franchised agents, direct factory branches, oil burner dealers, lumber dealers, coal dealers, and so on indefinitely. . . . It is significant, I think, that a recent survey of oil burner dealers disclosed that 30 per cent are handling gas burners, 30 per cent are handling stokers, 65 per cent are handling furnaces, 67 per cent are handling boilers, 43 per cent are handling winter air conditioning equipment, 34 per cent are handling summer air conditioning, 32 per cent are selling complete summer and winter air conditioning apparatus.

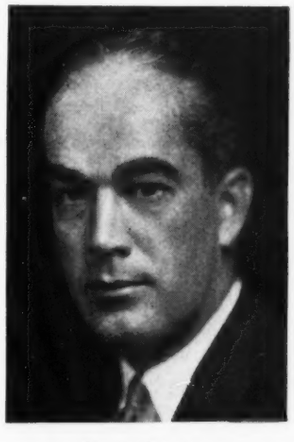
W. R. Rybolt

"I call your attention to another serious problem—that of competition from other types of heating. Already organization has been effected in Chicago of accessory manufacturers, plumbing and steam supply jobbers, heating and piping contractors, manufacturers of radiator heating equipment to foster an organization and conduct co-operative advertising for the purpose of advancing the favorable features of radiator heat and propounding the ability of radiator heating systems to furnish air conditioning.

Outside Competition

"While 1935 showed an increase of almost 100 per cent in residential construction, neither the boiler nor the furnace industry enjoyed any such increase. This indicates, I think, the seriousness of the competition from other so-called "outside" firms. I have recommended to our Board of Directors that our association could well be a member of the Construction League, the purposes of which are to protect the best interests of the home owner.

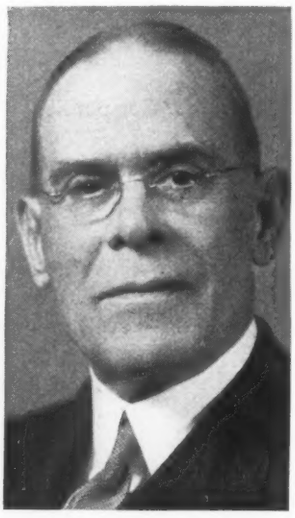
"I dislike to appear in the role of a pessimist, but I think attention should be called to the seriousness of the tax situation. Taxes have been increasing and will increase for several years to come—we will have to pay them and our children are going to have to pay them. Federal, state and municipal governments have been steadily increasing the burden of taxation upon business. Federal Corporation Income Tax for 1935 was 13¾ per cent, a flat rate; for 1936 the rate is graduated from 12½ to 15 per cent; the Capital Stock Tax for 1935 was $1.00 per thousand of declared value; for 1936 the rate is $1.40 per thousand. The Excess Profits Tax has been increased from a flat rate



L. R. Taylor

D. W. Norris

of 3 per cent to the rates of 6 and 12 per cent. Federal and State Payroll Taxes for 1936 will be approximately 1 per cent of the total payroll. Workmen's Compensation Laws are now being made effective



Allen W. Williams

in practically every state and the cost of such legislation must be paid for by the manufacturer."

F. H. A.

Readers who attended last years winter meeting will remember A. O. Eberhart, formerly governor of Minnesota, who represented the Federal Housing Administration. Ex-governor Eberhart this year again related many interesting Swedish jokes and quaint sayings and, as he did last year, brought out how important good homes, of which children may be proud, are to the continued progress of the nation. He asked members to write their congressmen for the extension of FHA beyond April 1, 1936, and pointed out that if FHA has done nothing else it has cleared up the mortgage situation and that in the future home owners can expect single-term mortgages for the duration of the time required for them to pay out and own the home completely in place of the term renewal type of mortgage which has cost the home owner so much money in fees.

Insulation

Professor J. D. Hoffman of Purdue University, addressing the convention on insulation, recommended that insulation be applied on the inside surface of solid masonry walls also on hollow masonry walls and, further, that hollow masonry walls be filled with insulating material if this is practicable. Brick veneer houses, in which the veneer is anchored to the frame and is not a solid part of the wall, should be insulated in the space between the

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veneer and the sheathing. Professor Hoffman suggested that wood sheathing be not replaced by rigid fiber board on the exterior. A further suggestion was the use of ⅞-inch sheathing to which is added ½-inch of fiber board for insulation. Professor Hoffman strongly recommended the filling of between-stud spaces with an insulating material which will not tend to pack as time goes on.

The speaker pointed out that the spaces between studs at the attic floor should be shut off either with insulation or wood to eliminate the between-stud flues which carry fire from basement to attic or which serve as air circulators to reduce the inside wall temperature. Floored attics which are not filled with insulation act as horizontal fire tubes to spread fire and where possible should be filled either with a bat form or with the poured-in type of insulation.

As to which gives better results, the insulating of the attic floor or the application of insulation to the attic roof joists, Professor Hoffman recommended that the roof be insulated if the attic space is to be used and if not then by all means use the space between joists of the attic floor. In reply to a question on the cost of insulation and whether it is economical, Professor Hoffman stated that if the cost of insulation does not exceed 3 per cent of the total cost of the house then insulation will pay for itself in not over four years time.

Gas Appliances

H. B. Johns of the Peoples Gas Light & Coke Company, Chicago, speaking on the subject "The Application of Gas to Warm Air Heating Systems" commended the Standard Code for Gravity Installations and the Mechanical Code for Forced Warm Air Systems as being the best things of their kind ever brought out by an industry and declared that the gas companies were following the recommendations of these two codes in determining whether or not a heating system was correctly engineered and installed. Mr. Johns stated that $25.00 per room per season, at a gas rate of 7 cents per 100,000 Btu. (1 therm) or 20 cents per square inch of first-floor leader

C. A. Olsen

pipe, 30 cents per square inch of second-floor leader pipe and 35 cents per square inch for third floor leader pipe, were typical costs for gas heating in the Chicago area.

The speaker went into considerable detail in presenting a discussion of draft hoods for controlling drafts as developed and used by the gas installing companies in this area.

Glass Temperatures

At the joint meeting Wednesday afternoon, W. C. Randall of the A.S.H.V.E. reported on "Room Surface Temperature of Glass in Windows." A summary of the

findings might be listed as follows: 1—For single windows and 30 per cent inside relative humidity, there will be deposition on the glass at an outside temperature of about 22 degrees. 2—For double windows a relative humidity of approximately 45 per cent will cause deposition at an outside temperature of 0. An increase in the relative humidity increases the outside temperature at which moisture will form by about 2 degrees F for each 1 per cent increase in relative humidity. 3—Tests indicate that there is practically no difference in the room surface temperature of single glass in steel and in wood windows. There appears to be some difference in the case of double glass although this may be accounted for by the difference in the air space between the panes of glass. 4—At inside temperatures of 70 degrees F. with wind, deposition will occur at about the outside temperatures our industry has used in the past.

Current Research

Professor A. P. Kratz, of the University of Illinois, outlined the nine co-operative efforts of the A.S.H.V.E. with the University of Illinois and other investigations on phases of air conditioning now under way in various universities and laboratories. Some investigations of interest to our industry are: Treatment of disease under conditioned air at the University of Illinois School of Medicine; dust and air

Richard Judd

cleaning devices at the University of Minnesota; standards for summer cooling at the A.S.H.V.E. Laboratory; corrosion of air conditioning equipment at the Michigan College of Mines; frictional resistance of air in small ducts at the A.S.H.V.E. Research Laboratory; heat requirements of buildings at Cornell and Texas A. M. & T. and the A.S.H.V.E. Laboratory.

Research Committee

F. G. Sedgwick, chairman of the Research Advisory Committee, National Warm Air Heating and Air Conditioning Association, made the statement that various research activities have taken warm air heating and air conditioning out of the class of chance and have made it a science. Mr. Sedgwick outlined some of the research on summer cooling, mechanical warm air heating; attic fan ventilation; and similar investigations which according to the

D. M. Dobbins

speaker have tended to remove air conditioning from a price basis and make it a science designed to increase the comfort of the owner.

Summer Cooling

S. Konzo, Special Research Associate at the University of Illinois, reported on the 1935 summer investigation of residence cooling using water from the Urbana city service mains. Mr. Konzo showed slides of the apparatus and described the methods of tests. A report of this investigation is not yet ready for publication but will appear in a future issue of AMERICAN ARTISAN.

Sales Plans

L. R. Taylor, Utica, New York, addressing the convention Thursday morning on "Merchandising in Our Industry" declared that one general plan for selling is not applicable to every situation. The speaker declared that he did not think that canvassing is a profitable effort for every contractor, but that canvassing can be made a profitable part of an intelligently planned sales campaign. In describing a method for laying out a sales program, Mr. Tay-

H. S. Sharp

lor declared that at the present time our industry is selling one furnace to approximately each 500 of population. Dividing the population of any city by five will give the number of homes and when the number of homes where owners cannot buy are eliminated we will arrive at some basis for determining the potential sales field. The speaker suggested that one-twelfth of the time can be profitably devoted by any contractor to sales and canvassing work.

He further suggested that if the contractor can not afford a salesman of his own it might be feasible to co-operate with an oil burner dealer, electrician, plumber or other tradesman in a plan wherein one salesman is hired by the entire group. The suggestion was also made that our industry might follow the example of the large manufacturer selling direct who compels dealers to conform to a set advertising and sales program. The speaker suggested that success may be based upon: 1—Knowledge of our products and our craft; 2—Definite establishment of the salable market; 3—The use of display rooms, advertising in moving picture theaters, clean stores, etc.; 4—The use of a sales campaign, for canvassing, hiring of salesmen, advertising, etc.;

(*Continued on page 74*)

Better Weather Protection [Copings]

No discussion of protection against water penetration would be complete without serious consideration of parapets and copings, for of all places where water enters a building, these two entrances have probably caused the most harm. Their very commonplaceness often causes neglect. Below we show a result familiar to every contractor and three common sources of water entrance.

OF ALL the places where water may penetrate the walls of a building to cause damage, copings and parapets are cited by many contractors as the seat of more mysterious trouble than any other part of a building. Seemingly water seeping into a parapet is predestined to follow as devious a course as possible so that plaster when it falls may be a room or two removed from the parapet which caused the trouble.

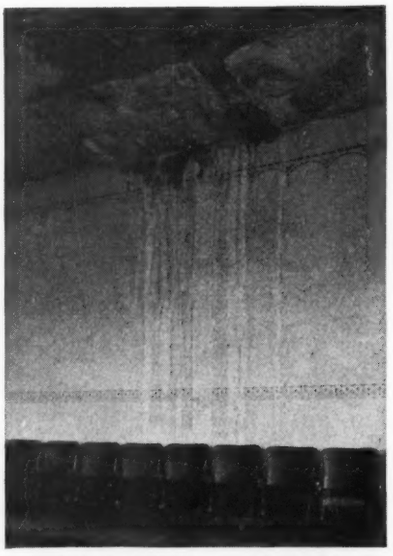
And because parapets and copings have caused so much difficulty we find that numerous ingenious methods have been devised for keeping water from gaining an entrance to the channels between masonry units.

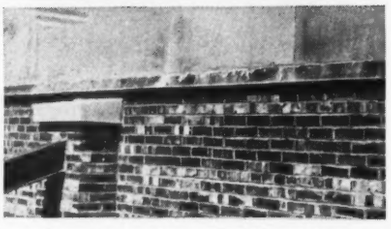
The methods of flashing copings vary considerably, each method being based primarily on the kind of material of which the parapet is made. This has been found necessary because different materials produce different channels for water flow and require different methods of sealing the channels.

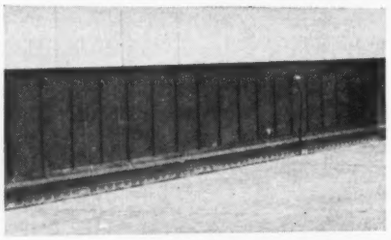
Recommended Practices

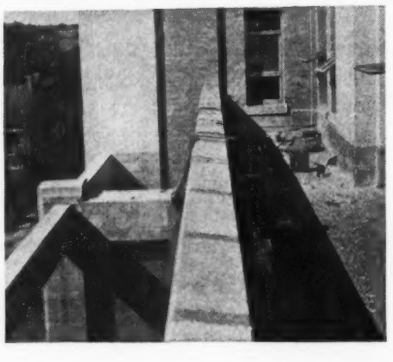
The diagrams on the facing page show recommended methods for flashing parapets or copings; also show several types of materials, and the metal work best suited to the material types.

Fig. 1 shows a recommended method for flashing a parapet which has an outside cornice. The parapet material is terra cotta facing with brick backup. This construction has been found to possess a tendency toward water penetration probably because of the difficulty of tightly bonding the two materials. It is recommended that the entire top be covered so that the joint between the two materials is protected. A roll forward edge is recommended with the cap sheet extended down over the back where it is locked to standing seam siding as shown. The lower edge of the siding section is loose locked to a roof flashing about 4 inches above the roof line.









The cornice should be capped with a complete cap as shown by forming a drip along the forward face and carrying the single sheet back to the parapet wall where it is turned up as a base flashing for a cap flashing as illustrated. This cap flashing should be sunk into the wall behind the terra cotta facing. If the cornice has more than 2 feet of projection a longitudinal soldered and locked seam is suggested or the cornice cap can be formed from small sheets flat locked and soldered.

Parapet with Coping

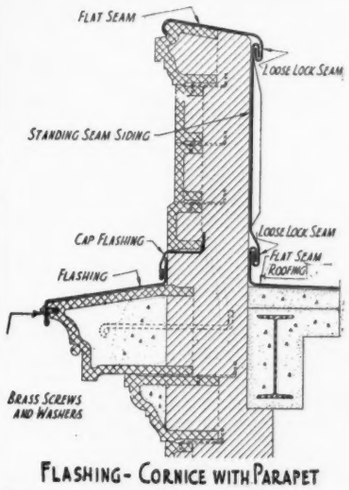
When a parapet wall is surmounted by a coping stone (Fig. 2) through wall flashing should be provided under the stone. This breaks the mortar bond and necessitates dowels which are water-proofed with a metal collar as shown. This is soldered to the flashing. It is suggested that the dowel holes in the flashing be cut on the job, the surplus material being turned up around the dowel inside the collar. The flashing should be turned down the back side of the parapet and should lap the base flashing at least 3 inches.

If the parapet is more than 24 inches high, wall siding with standing seams as shown is recommended. If the parapet is faced with stone the cap flashing can stop short of the outside face ½ inch, but if a

(*Continued on page 72*)

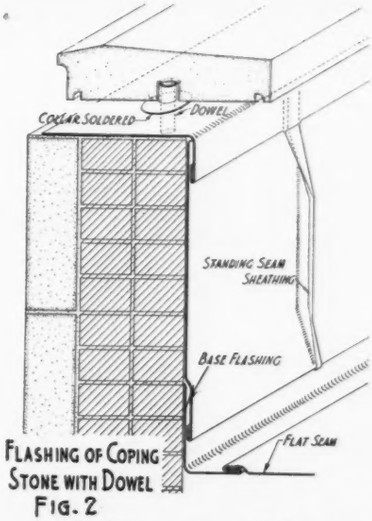
COPINGS

Probably more schemes for keeping water from entering parapets and copings have been devised than have been thought of for other parts of buildings. While we cannot hope to show all these schemes we show those which enjoy wide acceptance and have proved their practicability.



FLASHING - CORNICE WITH PARAPET

FIG. 1 This construction is recommended for high parapets with an outside cornice. The lavish use of metal is amply justified.



FLASHING OF COPING STONE WITH DOWEL

FIG. 2 Coping stones on high parapets can be flashed through the wall if attention is paid to the dowel pins.

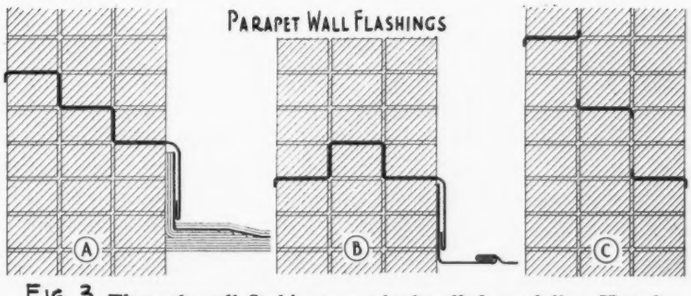


FIG. 3 Through wall flashing must be handled carefully. Keyed flashing provides a mechanical bond, but smooth flashing should be handled like this else the top of the parapet is free to fall off the base.

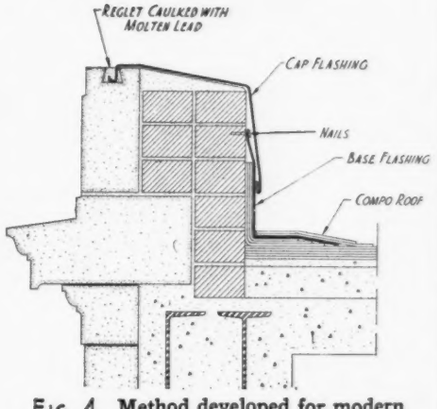
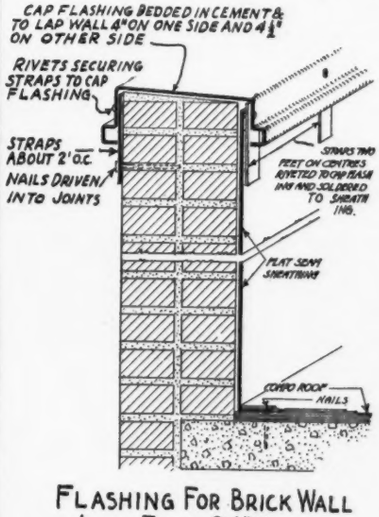
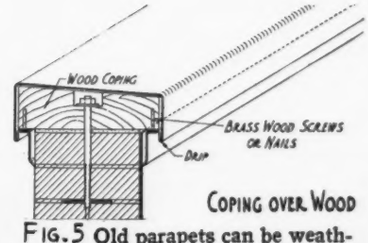


FIG. 4 Method developed for modern architecture having low parapet walls and decks.


CAP FLASHING BEDDED IN CEMENT & TO LAP WALL 4" ON ONE SIDE AND 4½" ON OTHER SIDE
RIVETS SECURING STRAPS TO CAP FLASHING
STRAPS ABOUT 2' O.C.
NAILS DRIVEN INTO JOINTS
STRAPS TWO FEET ON CENTRES RIVETED TO CAP FLASHING AND SOLDERED TO SHEATHING
FLAT SEAM SHEATHING
COMPO ROOF
NAILS

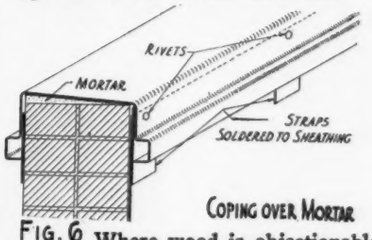
FLASHING FOR BRICK WALL LESS THAN 24" HIGH

FIG. 7 High, old walls throughout New England are frequently protected with a construction of this type. Full metal sheathing is used against heavy rains.



COPING OVER WOOD

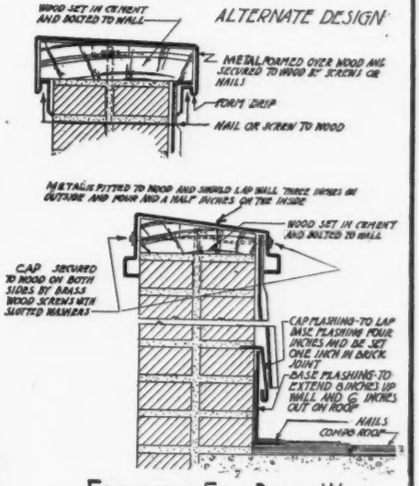
FIG. 5 Old parapets can be weather-proofed with a construction like this, all of which can be installed by the sheet metal contractor.



COPING OVER MORTAR

FIG. 6 Where wood is objectionable the cap can be pressed into a mortar bed like this.

FIG. 8 (BELOW) Two types of caps for brick walls. Where the cap cannot form its drip over the edge of the wood, form a square drip as shown.


WOOD SET IN CEMENT AND BOLTED TO WALL
ALTERNATE DESIGN
METAL FORMED OVER WOOD AND SECURED TO WOOD BY SCREWS OR NAILS
FORM DRIP
NAIL OR SCREW TO WOOD
METAL IS FITTED TO WOOD AND SHIELD LAP WALL THREE INCHES ON OUTSIDE AND FOUR AND A HALF INCHES ON THE INSIDE
WOOD SET IN CEMENT AND BOLTED TO WALL
CAP SECURED TO WOOD ON BOTH SIDES BY BRASS WOOD SCREWS WITH SLOTTED WASHERS
CAP FLASHING TO LAP BASE FLASHING FOUR INCHES AND BE SET ONE INCH IN BRICK JOINT
BASE FLASHING TO EXTEND 8 INCHES UP WALL AND 6 INCHES OUT ON ROOF
NAILS
COMPO ROOF

FLASHING FOR BRICK WALL MORE THAN 24" HIGH

Exterior of the new auditorium showing the rear wall which the fire left standing.

The brick soap angles, the flashing and the gutters were all formed in this open job shop.

Copper Details For Hiram College Drainage System and Roof

SOME thirty miles from Cleveland lies the town of Hiram, seat of Hiram College, one of the best known small schools in northern Ohio. Some months ago the auditorium suffered a severe fire which made unsafe all but one wall of the building and practically gutted the interior. The new building, which replaces the old, is Colonial in architecture, as are the other buildings on the campus, and is wholly fireproof.

The building has brick, non-load bearing walls, clay tile roof, copper ornamentation, gutters, flashing and downspouts. The metal work, erected by the John Weenink and Sons Company of Cleveland consists of some 260 feet of crimped copper box gutter, 250 feet of corrugated, rectangular copper downspout, 160 feet of 10-inch O. G. gutter, special expansion joints and 116 squares of clay tile. The rather severe building is ornamented by a large front wood portico and a copper clad tower at the rear of the main building. Some 200 feet of copper flashing was used in valleys, all valley sheets being cut 20 inches wide and left open.

One of the interesting items in the contract is the brick soap angles. These angles, shown in a detail, consist of 2 by 1¾-inch galvanized iron, 24-gauge, formed in 8-foot lengths. Both legs of the angles are punched with holes at 6-inch intervals. These angles are used on the back wall which was left standing after the fire, but has been covered by a shallow brick course to make the exterior conform in color and appearance with new walls.

These angles are nailed into the old wall along every seventh brick course. When nailed to the old wall the angles support seven courses of small bricks called soaps. These soaps are really half bricks, having standard brick face measurements but being only half as thick. The holes are used for nailing and to give a mortar bond for the brick supported on the angles.

More than 2000 feet of these angles were required. All metal work, including the angles, was fabricated on the job with equipment

(*Continued on page 71*)

Closeup of the gutter around the tower, a downspout and a section of the stepped flashing at tower base.

Fred Appleton, Manager of the Weenink Sheet metal department, holding one of the brick soap angles.

EVO

E

AIR CONDITIONING SECTION

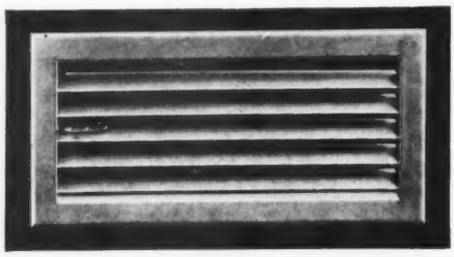
AMERICAN ARTISAN takes pleasure in announcing a new series of articles for 1936—to cover the engineering problems of converting existing gravity systems to mechanical circulation.

- - - As most contractors know, the problems of conversion differ considerably from the problems of new construction. Usually the owner or the building itself requires saving some parts of the old system such as risers and registers and these retained portions establish design limitations which we must consider.

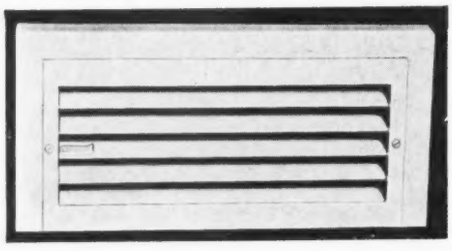
- - - The author, G. A. Voorhees, is well known to thousands of readers. His many years of practical work eminently fit him to write a series of this type. Readers are invited to present their particular problems for prior answer or for inclusion in the series.

WATERLOO

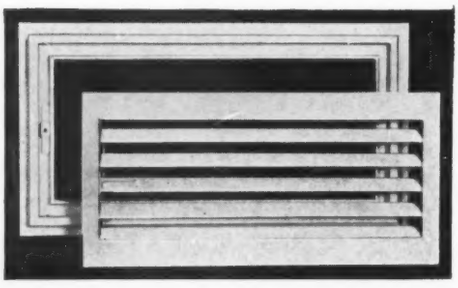
Air Conditioning REGISTERS



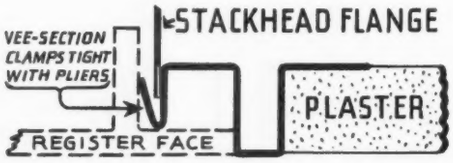
FH-100—Adjustable one-piece Venetian Type Register for walls.



FHD-204—Two-piece Venetian type adjustable register for baseboards.



FH-102—Venetian Type adjustable register for walls, with Vee-U plaster frame.



The Waterloo Vee-U Frame assures positive, tight connection with stack-head.

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NEW Compare Mueller's amazing new Oil-Fired Air Conditioning Furnace with any other heating plant you ever saw. Here is a truly modern furnace and air conditioning plant embodying new design covered by patents. The entire plant takes up no more space than an office desk. Visitors to the Heating and Ventilation Exposition at Chicago declared that this new furnace will set the pace for the industry.

NEW Opportunities abound for you with Mueller's newly styled Gas Furnaces, new Gas Boiler, Muelleraire Unit Heater, Climator Air Conditioners. And of course the standard Mueller Coal-Fired Furnaces. Be sure to get all the facts on these wonderful new Mueller items before you decide on any heating equipment. From your jobber—or write us direct.

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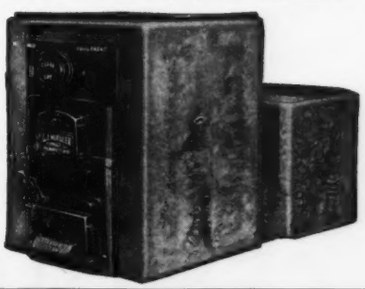
NEW Muelleraire enjoyed an instantaneous success. It is a portable Gas-Fired Unit Heater with filters, humidifier and blower, and opens a tremendous market among stores, showrooms, shops, bars, etcetera. It is beautifully styled and attractive in appearance.

NEW Mueller Full-Front Furnace is now available in beautiful square casing with radiused corners and prismatic lacquer finish. Here it is connected to the newly styled Climator IV.



NEW Radiused corners bring new style and added strength to the Mueller Climator III. This all-in-one conditioner enables you to provide an Air Conditioning unit for furnaces already installed.

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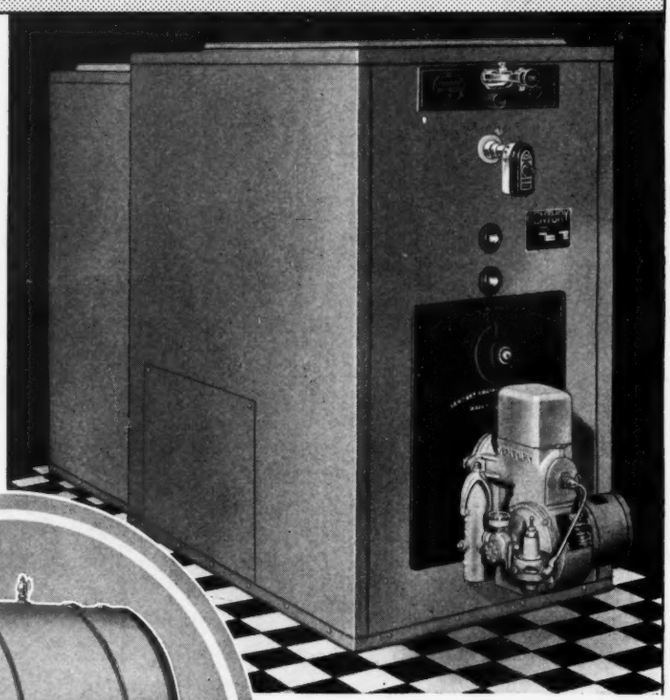

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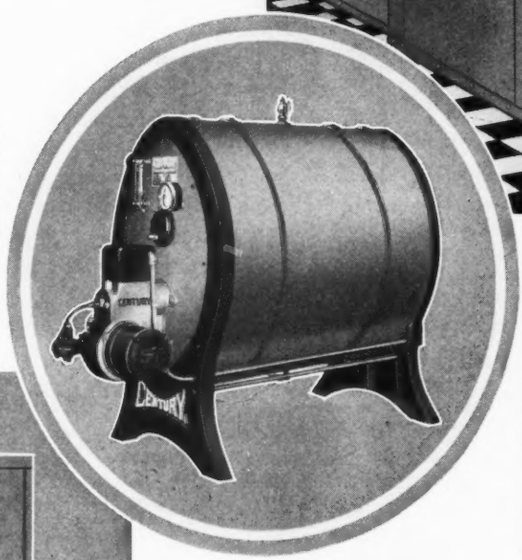

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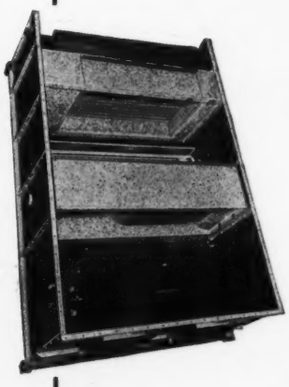
WARM AIR FURNACE UNITS . . . WATER HEATERS
HUMIDIFIERS . . . AIR CONDITIONING

A New Data Bulletin on Comfort Air Conditioning



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We know that the tables, charts and other data contained in this book will be of great value to the engineer, contractor and user of air conditioning equipment.

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By G. A. Voorhees
Chief Engineer,
Furblo Company

IF we want to make profits in mechanical heating and air conditioning, regardless of whether we are making new installations or revamping old ones, keep this commandment: DO THE ENGINEERING BEFORE THE SALE IS MADE — NOT AFTERWARD. Let's see what constitutes engineering as applied to the conversion of an old gravity warm air job into a modern blower system. Just what engineering steps are needed before the sale is made?

Simply because a blower of proper capacity will IMPROVE the operation of ninety-nine deficient gravity jobs out of a hundred, is no excuse for ignoring the engineering phases of the problem.

Don't take this to mean that *every* conversion job needs to be as thoroughly and accurately engineered as a completely new forced air heating or air conditioning system such as we would install in a new and pretentious dwelling. We've got to exercise reasonable judgment. Some conversion jobs do need to be figured and laid out just as painstakingly as the most elaborate new system. Others require nothing more than the mere addition of a blower to the old gravity plant. Both are extremes which we'll occasionally meet—but 95 per cent of our work of revamping old gravity jobs into more effective forced air systems will fall somewhere between these extremes.

The rare occasion when the remodeled system is to be laid out exactly like a new one, doesn't fall within the scope of this series of articles. The other, almost equally rare case when nothing need be done except add a blower to the original installation, will also be dismissed with just this word of caution: Be VERY sure that your customer will be completely satisfied with an improvement in the heating results—that he's not looking for and will not expect an ideal system; and be equally sure that the blower *will* give your customer the improvement he expects.

IF WE ARE to make real money in one of the most profitable fields of warm air heating—the conversion of old gravity plants into modern forced air heating systems—we must recognize the truly intimate relation between sales and engineering.

Something like this may look very fine on your sales record:

Cost of blower	$ 75.00
Cost of material	25.00
Cost of labor	30.00
Overhead expense	30.00
Total	$160.00
Sold the job for	200.00
Profit	$ 40.00

But these figures may be only the first chapter of the story. There may be trouble calls, trips to service the job because it doesn't come up to the user's expectations; money for material and labor to change this, that and the other thing. Your record may show a $40.00 LOSS instead of a $40.00 profit. Some furnace men are so keen to sell they overlook the engineering problems involved in remodeling a gravity plant for mechanical circulation. They fail to make any real profit for one of two reasons:

1. After the sale is closed they discover they overlooked vital changes which should be made in either the warm air leaders or cold air returns—or both. So to avoid losing money they merely install the blower and leave the piping system as it was. They take a chance and wind up with trouble. Since the customer isn't satisfied, they either have to spend money to make the system right or they evade the customer's demands and make him a "knocker."

2. If they go ahead and make changes regardless of cost, they make the customer a booster, but have spent more than the price justified.

If, for instance, the old plant has been unsatisfactory because of a faulty chimney which would not enable the user to burn the quantity of fuel required to heat the house, don't deceive either yourself or your customer into thinking that the mere addition of a blower will overcome the trouble. In spite of what an over-enthusiastic salesman may tell you, a blower isn't a magic cure-all; it will do a great deal toward making a deficient gravity job BETTER—but it can't do the impossible.

In some respects, the remodeling of an old plant is more difficult from the engineering standpoint, than the design of a forced air system for a new building. We often find ourselves faced with certain limiting conditions with which we probably wouldn't have to contend if the plant were being laid out for a new house where we could have a freer hand in specifying duct sizes.

In an old house for example, it is often inconvenient, expensive and sometimes next to impossible to install new wall stacks inside the first floor partitions to supply second floor rooms. Therefore one of the first and most important steps in engineering the conversion job, is to carefully investigate the sizes of existing second (and third) floor warm air supply risers, and to compare each with the quantity of heat which it must deliver.

This at once calls for a determination of the heat losses of at least some of the up-stairs rooms. To measure these losses we may use either (1) the Standard Gravity Code, (2) the Me-

chanical Warm Air Heating Code or (3) the "direct B.t.u. method."

Take for example, a house, the second floor plan of which is shown in Fig. 1, and suppose that all wall stacks are 3-in. by 12-in. Since room "E" is the largest, has the greatest area of glass, exposed wall and cold ceiling, it's evident that if the original 3-in. by 12-in. riser is large enough for that room the same size of riser will be ample for each of the other rooms. For this particular job then, room "E" may be called the "doubtful room" and it is the one for which we should compare the available riser size with the hourly heat requirement.

Always use one definite systematic *method* in making heat loss calculations. You can use the Gravity Code sheets obtainable from the National Warm Air Heating and Air Conditioning Association, or you can get data sheets especially prepared for forced air heating calculations from various furnace and blower manufacturers.

Fig. 2 shows part of such a sheet provided by a blower manufacturer. The "factors" listed for the various exposures are the familiar "Table A Factors" as given in both the Standard (Gravity) and the Mechanical Heating Code. The quotients obtained by dividing the various areas of exposed surface and the cubic feet of estimated infiltration, added together give a total of 11.9 as shown. This total is not given a name in the Gravity Code, but in the Mechanical Code it is called the "Room basic factor" and *it is the heat loss of the room in thousands of B.t.u. per hour.* Hence the heat loss of this room is:

$$1000 \times 11.9 = 11{,}900 \text{ B.t.u. per hour.}$$

Since warm air is supplied through a 3 by 12-in. wall stack, having a cross sectional area of 36 square inches, if this stack is to furnish enough heat, each square inch of its area must deliver:

$$\frac{11{,}900 \text{ B.t.u. per hour}}{36 \text{ Sq. In.}} = 330 \text{ B.t.u. per sq. in. per hr.}$$

Referring now to Table No. 1, we find that the following combinations of register air temperature and air velocity (f.p.m.) in the duct will deliver 330 or more B.t.u. per square inch per hour:

725 f.p.m. and 135° delivers 337 B.t.u. per sq. in. per hr.

675 f.p.m. and 140° delivers 336 B.t.u. per sq. in. per hr.

625 f.p.m. and 145° delivers 332 B.t.u. per sq. in. per hr.

600 f.p.m. and 150° delivers 339 B.t.u. per sq. in. per hr.

575 f.p.m. and 155° delivers 344 B.t.u. per sq. in. per hr.

525 f.p.m. and 160° delivers 330 B.t.u. per sq. in. per hr.

(*Continued on page* 50)

TABLE I

Heat Delivery Per Square Inch of Duct Area for Various Air Velocities in Duct and Various Register Air Temperatures

Air Velocity in Duct f.p.m.	Air Delivery CFM per sq. in. Duct Area	Heat Delivery Btu/Hr. per sq. in. Duct Area for Register Air Temperature of 135°	140°	145°	150°	155°	160°
400	2.78	186	199	213	226	239	251
425	2.95	197	211	226	240	254	267
450	3.13	209	224	239	254	269	283
475	3.30	221	236	253	268	284	299
500	3.47	231	249	266	283	299	315
525	3.65	244	261	279	297	314	330
550	3.82	256	274	293	311	329	346
575	3.99	267	286	306	325	344	362
600	4.17	279	298	319	339	359	377
625	4.35	290	311	332	353	374	393
650	4.51	302	323	346	367	389	409
675	4.69	314	336	359	381	404	425
700	4.86	327	348	372	396	419	440
725	5.04	337	360	385	410	434	456
750	5.21	349	373	399	424	449	471
775	5.38	360	385	412	438	464	487
800	5.56	372	398	425	452	479	503
850	5.90	395	423	452	480	509	535
900	6.25	418	448	479	508	539	566
950	6.60	441	472	505	536	569	598
1000	6.95	465	497	532	565	599	630

Based on Equation (8) Mechanical Warm Air Heating Code, 3rd Edition.

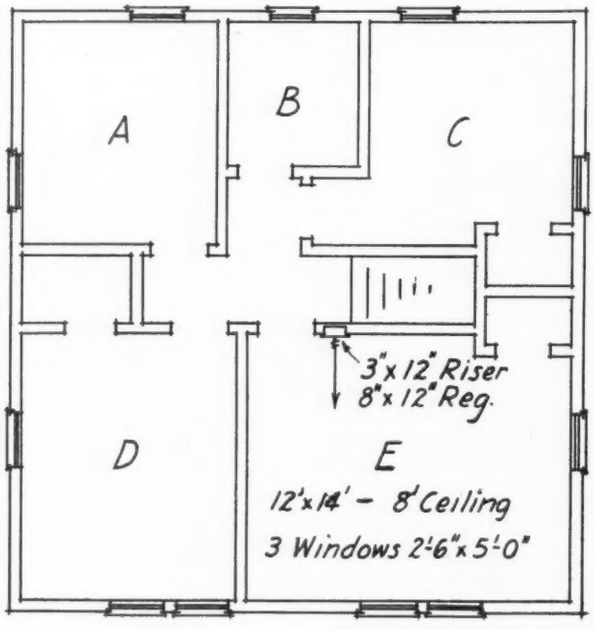


Fig. 1

Fig. 2

Windows and Outside Doors			No. of Room E	Floor 2
Size	No.	Area	Name of Room FRONT BED	
2½x5	3	38	Dimensions 12x14	
			Ceiling Height 8	
			Exposed Wall Running Ft. 26	
			Gross Area Exp. Wall 208	

		Factor	B.t.u. or B.t.h.
Total Glass Surface =	38	12	3.2
Net Exposed Wall =	170	60	2.8
Cold Inside Partitions =	—		
Cold Ceiling =	168	50	3.4
Cold Floor =	—		
Leakage Loss =	2016	800	2.5

Miscellaneous Data pertaining to this room.		
Content 1344	Sub-total	11.9
	Add for Temperature	—
	Sub-total	—
	Add for Exposure	—
	Room basic factor or B.t.u. per Hr.	11.9

Metal Foil Insulation Reduces "Cold" Costs

By I. C. Williams

WITH a product like aluminum foil having in its favor low cost, ease of installation and wide diversification of use there is no end to potential markets. The Harold Holmes Co., dealers in Reynolds Metallation and G. E. Air Conditioning, 50 Exchange Place, Salt Lake City, have not only sold it to private residences, ice cream companies, general stores, a church and C.C.C. camps (about 35,000 square feet to the latter for insulation purposes in camps), but they have also made a novel installation at the Hudson Bay Fur Company that is of interest.

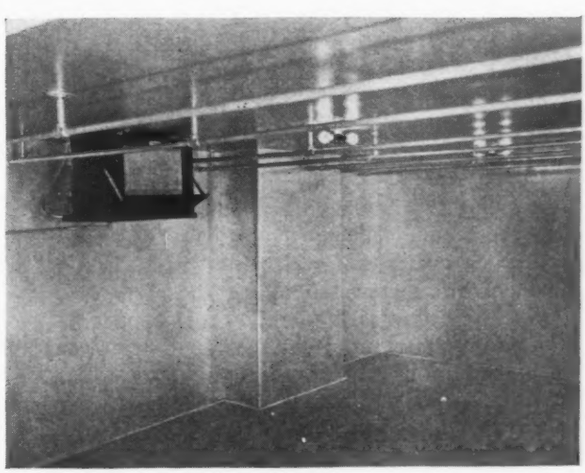
Previously an ammonia cooling system was used and pipes ran along the ceiling. This type of a cooling system had its drawbacks for the reason that it tended to produce moisture in the cold storage vault and this in turn rotted the linings of many of the coats. Then, too, under this former plan it was necessary to keep the cooling system running 24 hours a day; there was a tendency at times toward a gaseous odor, and the pipes did not add to the appeal of the place when customers requested to see the cold storage vault before they stored their coats. Broadcloths stored under such conditions cracked. Such replacements on linings and coats naturally ran the costs up considerably.

Investigations were made into several types of vault cooling systems, but there were certain things which made them undesirable as well as expensive to install. Other cooling systems dried out the natural oil in the furs because they supplied no means of counteraction for this tendency.

Prior to that time not much thought had been given to the properties of sheet insulation, but when an article appeared in Time magazine telling of its various uses and high efficiency in keeping cold temperatures consistently the same an investigation was made and consultations with the Holmes firm convinced the Hudson Bay Fur Company that if the product could live up to its claims and the guarantees made for it and such installations that it would be ideal for their particular use.

In the installation there are five layers of the metallation built up all around the cold storage vault. This, coupled with the cooling facilities keeps the temperature continuously at 32 degrees which is the right coldness for the coats. The fact that the temperature is controlled, that it doesn't fluctuate as was natural under other cooling systems is advantageous. The nature of the installation is such that it is moisture-proof thus protecting the coats and yet it is not drying to the point of absorbing natural oil out of the furs. So compact is the vault, so thoroughly insulated against warm air coming in, that where it was previously necessary to keep the compressors running 24 hours a day they now need operate but 9 to 11 hours daily to accomplish the same results. This cuts the operation costs to a point that makes this present cooling system one-third more economical to operate than the other cooling systems investigated.

Comparison of the actual costs in storage by close examination of them and feeling of several of the pelts in different fur coats that have been stored for many months illustrated that the present cooling system seems to benefit the furs—they were soft and luxurious as though they were new.



1—The photograph shows "after" and the one above "during" views of the vault described

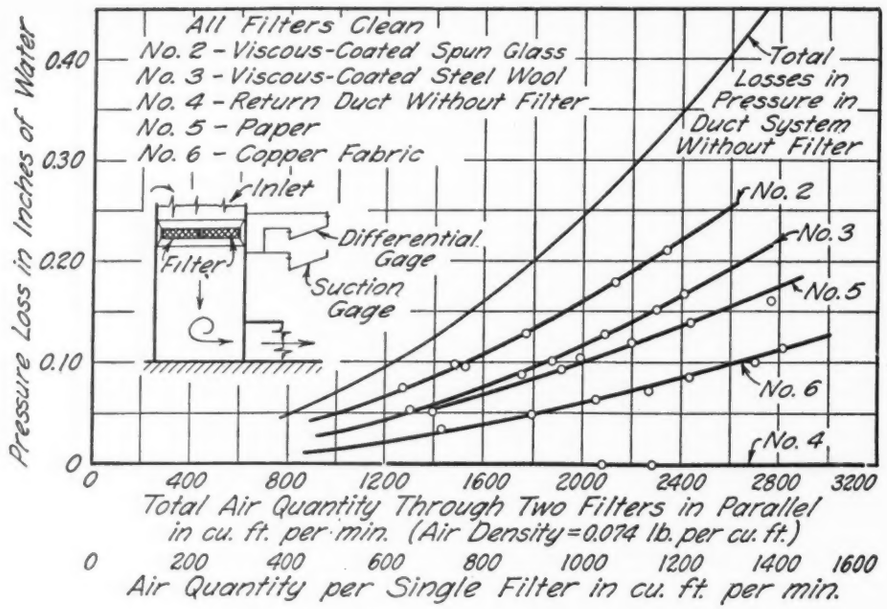

All Filters Clean
No. 2 - Viscous-Coated Spun Glass
No. 3 - Viscous-Coated Steel Wool
No. 4 - Return Duct Without Filter
No. 5 - Paper
No. 6 - Copper Fabric
Inlet
Filter
Differential Gage
Suction Gage
Total Losses in Pressure in Duct System Without Filter
No. 2
No. 3
No. 5
No. 6
No. 4
Pressure Loss in Inches of Water
0.40
0.30
0.20
0.10
0
0 400 800 1200 1600 2000 2400 2800 3200
Total Air Quantity Through Two Filters in Parallel in cu. ft. per min. (Air Density = 0.074 lb. per cu. ft.)
0 200 400 600 800 1000 1200 1400 1600
Air Quantity per Single Filter in cu. ft. per min.

Fig. 1 — Pressure losses through four types of clean air filters

Forced Air Heating Facts From the Research Residence

By S. Konzo
Special Research Associate
University of Illinois

In the previous month's article, the author presented a condensed table of pressure losses for the use of designers of forced-air heating systems. One item in the table was with reference to the pressure loss of air filters. In this present article a more detailed explanation of filters and their characteristics is presented. Part of the article is based on tests conducted at the University of Illinois as reported in Bulletin 266 of the Illinois Engineering Experiment Station. Additional sources of information have been investigated by the author and the results are here presented.

Filters—and Their Characteristics

Description of Tests

A FEW tests were made in the Research Residence to determine the pressure losses through several different types of air filters. No attempt was made to measure or evaluate the cleaning efficiency or the amount of dirt removed from the air. For the purpose of these tests, the filters were installed in the cold air return duct just above the inlet to the fan. The cold air return duct was swaged in to accommodate two 16 in. by 25 in. filters, thus presenting a gross, or face, area of 5.56 sq. ft. for the filters.

In all cases two 16 in. by 25 in. filters were used, placed edge to edge, with the surfaces normal to the flow of the air They were designated by numbers as follows:

No. 1—Viscous-coated spun glass filter, 2½ in. in thickness, that had been in service 30 days.

No. 2—Viscous-coated spun glass filter, identical with No. 1, but recently installed and clean.

No. 3—Viscous-coated steel wool filter, 2½ in. in thickness, recently installed and clean.

No. 4—Return duct without filter.

No. 5—Paper filter. Thin layer of porous paper folded over a frame of copper wire screen forming a corrugated surface normal to the flow of air. Depth of corrugations 3 in. Recently installed and clean.

No. 6—Copper fabric filter. Several layers of copper shavings woven into a fabric and held in place by heavy wire; large mesh netting on one side and three layers of fine cut steel grilles on the other. Thickness 1 in. Recently installed and clean.

For any given filter installation the air delivery of the fan was varied by varying the sizes of pulleys on the fan and motor shafts. A number of fan speeds were thus obtained, covering the range of from 330 to 620 revolutions per minute. At each of the fan speeds used, observations were made of the pressure drop through the filter, the volume of air delivered by the fan, the power consumption of the fan and motor, and the air temperatures. The pressure drop through the filter was determined by means of a differential inclined tube manometer arranged as shown in the inset in Fig. 1. The pressure indicated was therefore the true total depression, and since no change in air velocity occurred between the two points of attachment, the reading of the gage was a direct measure of the loss in pressure through the filter.

The volume of air delivered by the fan was determined by means of anemometers which were calibrated in place.

In the test made for the purpose of determining the rate at which the pressure drop through the filter increased with service, the filter was left in service for a period of 26 days and the plant was operated normally to supply the varying heat demands of the house over this period. Daily observations of volume of air delivered by the fan and of the pressure drop through the filter were made. The power input to the fan motor was observed at the beginning and the end of the period.

Pressure Loss Through Clean Filters

The loss in pressure through, or the resistance of, the different types of clean filters tested, correlated with the total volume of air circulated by the fan, is shown in Fig. 1. For convenience, the volume of air per filter is also given. It may be noted that the drop in pressure through the swaged portion of the cold air duct without any filters in place, arrangement No. 4, was zero for all fan deliveries. Hence the drop in pressure read on the differential gage with the filter in place represented directly the loss in pressure through the filter alone. This loss in pressure depended on the type of filter and was greater for the more closely packed or woven filters than it was for the ones less closely packed or woven.

The values for the pressure losses for the various types of filters which were tested (Fig. 1) may be listed in tabular form, as follows:

TABLE 1.

Observed Pressure Loss Through Filters, In. of Water.

	Air quantity, c.f.m. per filter.		
Filter No.	400	500	600
2	0.04	0.05	0.07
3	0.03	0.04	0.05
5	0.02	0.03	0.04
6	0.01	0.02	0.03

The author has also examined similar pressure loss data presented by Professor Rowley and in manufacturer's catalogs. A rounded value for the viscous-coated fiber type of filters was selected from the available data and presented in Table 2 of the January article.

(*Continued on page* 40)

Performance data for two types of air filters, as published in Bulletin 117 of the American Air Filter Co. Courtesy of the American Air Filter Company.

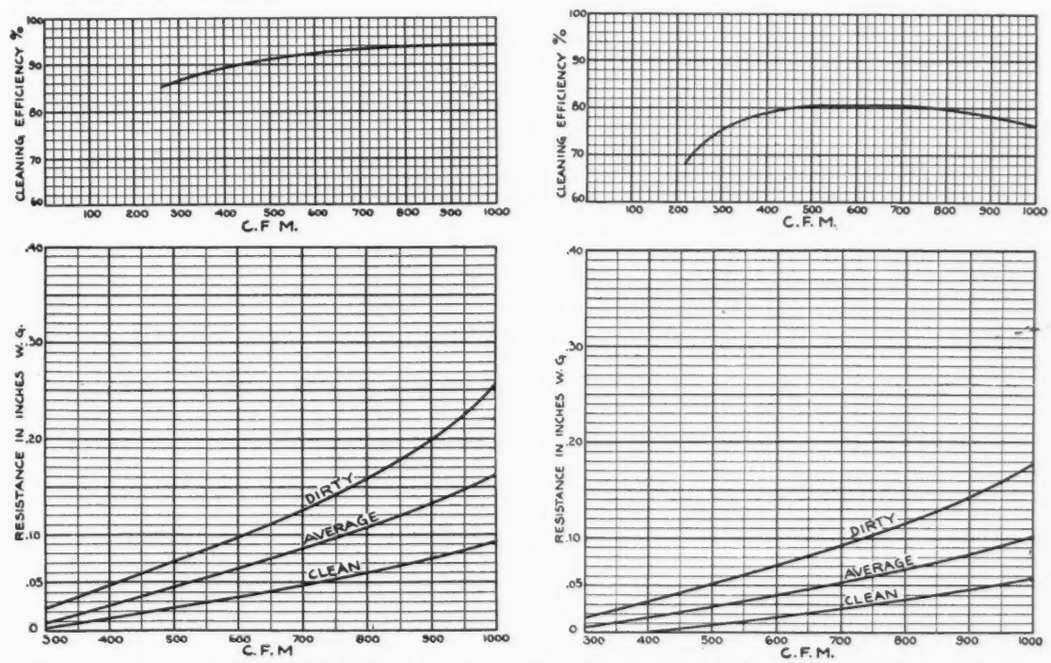


Fig. 2—The curves on the left are for the "Reed E-Z-Kleen" filter, which is a more closely packed filter than the "American wafer" filter, whose performance curves are shown on the right. Note that the higher resistance of the former filter is accompanied by higher cleaning efficiency. It is apparent that both cleaning efficiency and pressure resistance should be considered when selecting a filter for a given service

Some Basic Principles of Humidification [Part 2]

By O. J. Kuenhold

Engineer, Monmouth Products Co., Cleveland, O.

IN A modern warm air heating plant, the size of the furnace and dimensions of ducts, registers, etc., are carefully calculated so that it is definitely known that the desired room temperatures will be attained under any weather conditions. No reliable heating contractor or engineer would think of merely making a wild guess at the required size of furnace ducts, etc., and yet this is the usual procedure with respect to the humidifying equipment.

It is common to see a splendidly engineered conditioned air heating plant, scientifically designed to the last detail—except as to the humidifying equipment. This is usually thrown in as an unimportant detail. And yet, it is humidification of the indoor air which gives to conditioned air heating some of its most important and most talked about advantages.

True, there is some excuse for this because too little information has been available to enable the required size of evaporating equipment to be intelligently calculated. The following discussion aims to eliminate that lack and to present a simple but scientific method for calculating the evaporative requirements of any heating installation. The basic data included is the best available at the present time.

There are, of course, a number of ways to moisten air but for residential humidification, an evaporating pan placed within the dome or bonnet of the furnace is the most widely employed one and the following discussion is confined to that method. The principles discussed, however, apply to all air moistening methods.

Outline

It is fundamental and must be realized in the explanations to follow that a domestic humidifying system cannot function properly unless it includes:

(1) Adequate evaporating capacity while the furnace is checked down as in 35 to 40 degree weather.

(2) Automatic means to control the rate of water feed to the pan so that by limiting the evaporation to the rate of feed, the room humidity can be held down to practical and desirable limits during the colder weather when the furnace will be hotter.

The problem of finding the required size of evaporating pan comprises two main calculations:

(1) To find how much water must be evaporated into the indoor air per hour or day during 35 or 40 degree weather.

(2) To find how much water per hour or day *can* be evaporated per square foot of water surface during bonnet temperatures prevailing in 35 or 40 degree weather.

In order to know how much water must be evaporated per day under the conditions given above we must know:

(1) How much outdoor air enters the heated space of the home through outdoor air intakes and by leakage at door and window cracks, etc.

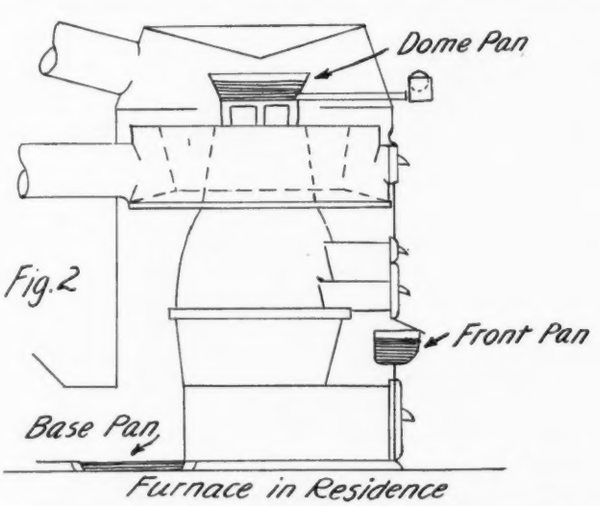
(2) How much moisture must be added per cubic foot of incoming air to hold the room humidity up to the desired per cent.

In order to know how much moisture must be added per cubic foot of incoming outdoor air we must know the average prevailing outdoor humidity in grains of moisture per pound and how many grains of moisture per pound the indoor air contains when a practical and desirable per cent of indoor humidity is maintained.

When the above factors are understood and the simple rules for calculating them are applied, the proper size of evaporating pan can be intelligently determined and every humidifying installation can be made to function perfectly over the entire range of winter weather.

Why Leakage Determines Evaporation Required

The air in homes is constantly changed by outdoor air leaking in upon the windward side, drifting across the house and escaping on the leeward side. If the humidity of the indoor air is raised so as to contain more water vapor per pound than the outdoor air, then added moisture is constantly carried out of the house along with the escaping air on the leeward side; and the inleaking air on the windward side, which contains less moisture than the



Cross section showing locations for three common types of evaporating pans.

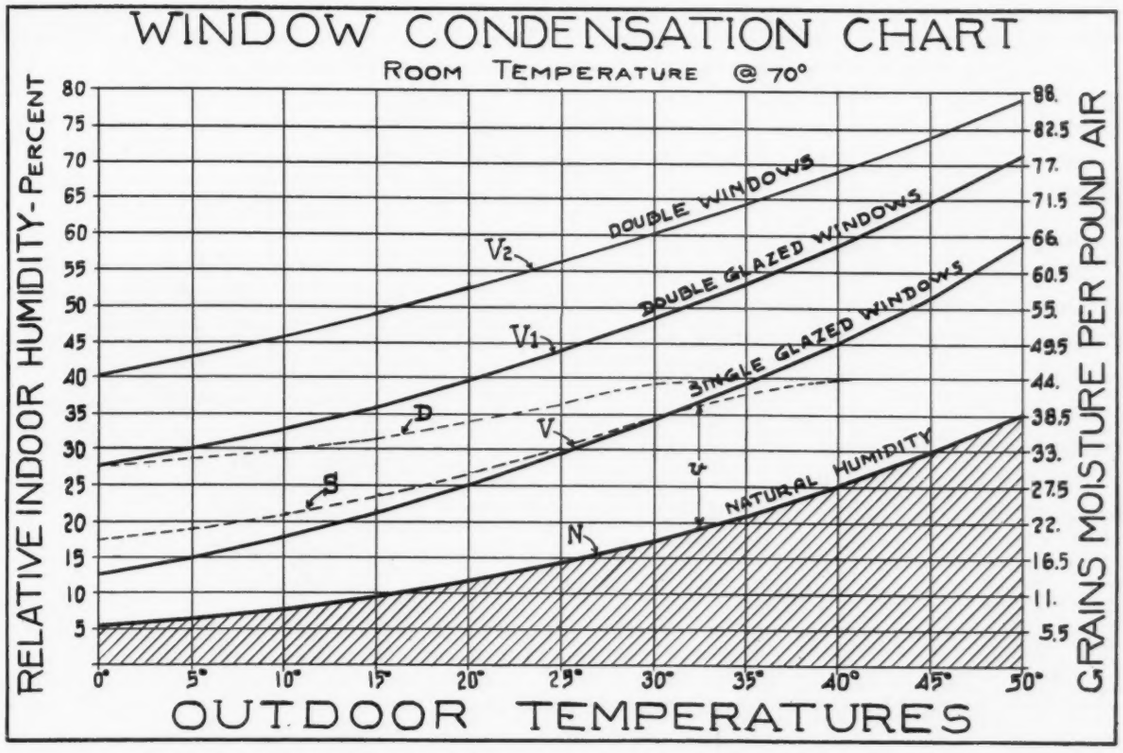


Chart 5—The basis for calculating amount of moisture to be added to house air.

indoor air, constantly dilutes it and thus constantly reduces its humidity.

To offset this constant dehumidifying process and maintain the indoor humidity up to the desired percentage, moisture must constantly be added to the indoor air at the same rate per hour as the rate at which the moisture escapes.

Calculating Air Leakage

The hourly volume of outdoor air drifting through a house depends mostly upon how tightly the windows and doors are fitted. In-filtration through walls or other points than door and window cracks may be ignored in well built homes. The following table, if used with good judgment, will enable the volume of air leakage to be calculated with adequate accuracy.

Air Leakage Table

Door and window fit	Air changes per hour	Air leakage per running ft. of door and window cracks
Poor	2	60 cu. ft. per hour
Fairly good.....	1	30 cu. ft. per hour
Weather stripped..	½	15 cu. ft. per hour
Storm windows....	½	15 cu. ft. per hour

See instructions for use below.

For houses of average size and construction, simply multiply the cubic feet of heated space by the estimated number of air changes per hour. For larger houses and those having an unusual number of windows, find how many running feet of window and outside door cracks there are **on the windward half of the house** and multiply by the estimated cubic feet of hourly air inleakage. The leakage given for storm windows assumes a fairly tight fit. It is also assumed that window frames in masonry homes have been well recaulked.

If there are outside air intakes these must be considered as they add considerably to the incoming air volume and hence to the required evaporation. For gravity circulating plants, a fair average assumption is 50 cubic feet of outdoor air coming into the house per square inch of intake duct area at its smallest cross sectional area. For forced air circulating plants, multiply the smallest cross sectional intake duct area **in square feet** by one-half the calculated duct velocity in feet **per hour.** (This assumes the blower turned on one-half the time).

Garage Air Lost

If a garage room is heated by forced air circulation it will of course have no return duct. The air thus expelled from the house to the garage room is replaced by increased leakage unless an outdoor air intake is provided, as should be done, to replace the air expelled to the garage room. Similarly, if air is expelled to outdoors or attic from rooms which have no return duct connection, such as bathrooms, and kitchen, then air so expelled will increase leakage unless outdoor air intake duct area is provided to replace the expelled air. In calculating the volume of air expelled from certain rooms of the house through outlet ducts, assume that only about one-half the air sent to such rooms is expelled and also assume that the blower is in operation half the time as it would be in 35 to 40 degree weather.

In homes heated by return duct system, any mois-

ture put into any rooms will be spread to all rooms by both recirculation and diffusion. In radiator heated homes, the moisture put into part of the rooms will be largely spread to all communicating rooms by diffusion. It is impossible to humidify one or a few rooms and not the others unless they are completely shut off.

The foregoing has outlined a method for calculating the total volume of outdoor air which enters and replaces indoor air each hour. It assumes the moderate wind conditions which prevail during nearly all of the heating season.

It is uneconomical to take outdoor air into a home except for replacing air that is expelled from the rooms that have no return duct connection. To take in more outdoor air than for such replacement is entirely unnecessary when the air is humidified. Normal leakage easily keeps the air fresh and humidification keeps it healthful.

Indoor Humidity to Maintain

When we have determined the volume of outdoor air which enters the house per hour, we have the basis for determining how much water must be evaporated per hour to maintain desirable humidity. We shall next discuss what is desirable humidity and certain related factors all of which are best made clear by Chart No. 5.

In Chart No. 5 the vertical lines represent outdoor temperatures from 10 to 50 degrees. Horizontal lines represent indoor humidities, given at the right in grains of moisture per pound of air and at the left in the equivalent per cent of relative humidity, when the room temperature is 70 degrees.

Curve N shows the indoor humidity that will exist during various outdoor temperatures, if no moisture is added to the indoor air from any source. This is called the "natural" indoor humidity. Note how the natural humidity gets lower as weather becomes colder. For instance, during 40 degrees weather the indoor humidity will average 25 per cent or 27½ grains of moisture per pound while in 25 degree weather it will drop slightly below 15 per cent.

Natural Indoor Humidity

The natural indoor humidities existing during various outdoor temperatures as shown by Curve N are averages subject to no material fluctuations at the left end of the curve, but may average slightly higher or lower at the right hand end in geographical locations having more moist or more dry atmospheric conditions in winter. The fluctuations in weather above 40 degrees are of no consequence. Curve N represents a base line from which the indoor humidity is to be built up to the desired per cent.

Curve V shows the per cent of indoor humidity at which window vapor begins to appear, on single thickness glass windows, assuming 70 degree room temperature. For instance, in 40-degree weather, vapor will not appear until the room humidity has been raised to 45 per cent, but in 20-degree weather, window vapor will appear when the room humidity has been raised slightly above 25 per cent. As the room humidity is raised an increasing per cent above the points shown by curve V, the window vapor spreads, then takes the form of water globules, and at about 5 per cent points higher than the point shown by curve V, it begins to trickle down. This is about the limit of practicable humidification for single thickness glass windows because at still higher humidity, the condensation becomes a nuisance.

It will be very apparent that humidity as high as 45 per cent can not be maintained during cold weather in homes having single glass windows, without excessive window wetness during such weather.

Double Glass Storm Sash

Curve V1 shows the window condensation results obtained if the windows have double glass panes with ⅛th inch air space in between. The indoor humidity can then be maintained about 14 per cent points higher before window vapor appears.

Curve V2 shows the window condensation results obtained when tight fitting storm sashes are added outside of the usual windows. In that case the indoor humidity can be maintained as high as 45 per cent, even in weather almost down to 10 degrees, before window vapor appears.

So far we have considered the high limits of indoor humidity only from the standpoint of window condensation. There are, however, certain other important points to be considered. If the room humidity is maintained as high as 45 per cent during the more extreme winter weather, one's clothing will be humidified 45 per cent while indoors, plus the added per cent of moistness due to perspiration. Upon going outdoors, the water vapor contained in one's clothing will be almost instantly condensed into moisture and this gives a noticeable sense of chill when passing to the cold outdoor air. The effect is the same as going out into the cold with slightly damp clothing.

Some Humidity Limitations

The maintenance of high humidity during extreme winter weather may result in wet spots on walls or ceilings, especially if the home is not insulated and, under certain conditions, slight but noticeable moisture condensation may be felt on furniture, especially on metal objects such as piano and bed frames. Because of these liabilities, home owners should not be encouraged to maintain high humidity during the colder weather.

Owing to the above, the indoor humidity should be maintained upon a sliding scale downward according to the coldness of the weather, regardless of whether the windows are single or double.

[Part 2 to follow]

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A FEW TYPICAL

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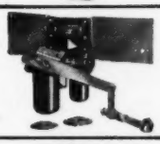
WHAT IT LOOKS LIKE	WHAT IT IS	WHERE IT IS USED	WHAT IT DOES
	No. 250 PRESSURE CONTROL	Furnished in several models for automatically fired heating boilers, commercial refrigeration and air conditioning units.	Pressure in flexible metal bellows element operates a switch mechanism to make and break an electric circuit. Unit controls boiler pressure, also low side pressures and temperatures in refrigeration.
	No. 444 SERIES THERMOSTATS	In low voltage control circuit.	Unit incorporates one or two bimetallic elements responding to temperature changes which make and break an electric circuit. Includes units for night and day control—also for heating and cooling.
	No. 431 DUCT DAMPER MOTOR UNIT	On zone ducts for forced air conditioning systems.	Operates duct damper in response to zone thermostat but prevents shutting off heat supply until all zone thermostats are satisfied.
	No. 683-R SOLENOID VALVE	In liquid refrigerant line—also in water supply line to humidifier.	Controls refrigerant supply in response to thermostat. Controls flow of water in response to humidistat.
	No. 291 SELF CLEANING NOZZLE	In any installation where water spray is used for humidification.	Provides fine water spray under constant control of humidistat. Self cleaning feature prevents a clogged orifice, common to conventional nozzles.
	CRC 234 SAFETY FLOAT VALVE	In fuel line of gravity supply to oil burner.	Controls amount of fuel delivered to burner by accurately metering the supply. Also provides safety shut-off in case flame is extinguished.
	No. 691 DIFFERENTIAL THERMOSTAT	In low voltage cooling circuit for air conditioning.	Operates through a relay to govern cooling unit in accordance with difference between indoor and outdoor temperatures. Available in either northern or southern range.
	CRC 270 PRESSURE REGULATING VALVE	In fuel line to pressure atomizing oil burners.	Provides adjustable regulation of fuel pressure at nozzle and prevents any flow during "off" periods of burner.
	No. 673 THERMOSTATIC EXPANSION VALVE	On the evaporator coil in cooling and refrigeration installations.	Keeps the evaporator full of refrigerant at all times. Available in a range of capacities up to 21 tons on Freon.

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Control Methods For Domestic Conversion Gas Burners*

[Part I]

By L. C. Price

Research Associate Professor of Mechanical Engineering, University of Arkansas

As a result of the extension of natural gas pipe lines and the opening of new gas fields, a number of dwelling houses are now using gas-burning heaters.

In a few instances it is probable that complete new heating equipment has been installed, designed especially to burn gas. In the great majority of cases, however, the use of gas has been made possible by simply installing a gas burner in the old furnace. Such a gas burner is called a conversion burner.

Most conversion gas burners are controlled by automatic devices which turn the gas on full, until the house becomes warm, and then entirely off (except the pilot flame). When the house temperature begins to drop, the gas is turned on again. It is possible, however, to control the fire in other ways, such as allowing it to burn continuously, but regulating the height of flame to suit the weather. This method is commonly called the throttling control. Again, the intermittent and throttling controls can be combined so that a reduction in the demand for heat causes the fire to be first turned low and then shut entirely off. The low fire is turned on again when the house needs more heat and then when still more heat is needed, the throttle valve in the supply pipe is opened further.

In all cases, proper combustion of the gas requires a certain amount of air, which usually enters the combustion chamber through an opening in the ashpit door. Any unnecessary air which passes through the hot passages of the boiler or furnace cools the passages so that less of the heat of the fuel is available in the house, and more fuel must be burned in consequence. In most cases, therefore, the air inlet opening is fitted with a damper whereby the air supply can be adjusted. When intermittent control of the gas is used, best economy is obtained by closing the air damper when the gas is turned off. This is done by connecting the damper to the fuel valve, so that both are operated together by the automatic control. When throttling control is used, the air damper must remain open continuously, but best economy requires that it be partially closed as the gas is throttled.

Conversion burners are usually fitted with automatic controls of the intermittent type which usually operate the gas valve and air damper together. Sometimes, however, one finds an installation in which the air damper is either absent or else does not close with the gas valve. When no automatic device is used, control is generally by hand throttling of the gas only. The writer has never seen an attempt to control the air supply of a domestic burner where throttling was used. It is natural that the operating economy should be affected by control or non-control of the air supply, and by the methods of controlling the fire.

Investigation revealed, however, a scarcity of exact information on the subject. As a result, the Engineering Experiment Station of the University of Arkansas undertook a series of tests on a small domestic heater, using gas fuel with several different conversion burners and various control methods in an attempt to determine the operating economy and practicability of the different control methods in domestic heating plants.

The object of these experiments was to determine which of the possible control methods is most economical, how much saving can be effected by the most economical method over the others, and what is the most practical method for burners of domestic size. It was also desired to determine the effect, if any, of sensitivity of control on the fuel economy.

Conclusions

Examination of the test results leads to the following conclusions, based on an average heating season in Fayetteville, Arkansas:

1. The ordinary intermittent control is as economical as any other type of control tested, provided the air damper opens and closes simultaneously with the gas valve, and provided also that the height of fire is not so great as to overload the heating plant. The heaviest fire which can be used economically *can only be found by experiment.*

2. Allowing the air damper to remain open during the "off" periods with intermittent control caused a waste of about 9 per cent of the fuel burned. It follows that, in cases where the air damper is absent, or remains open continuously, a saving of probably 9 per cent could be effected by connecting the air damper to the gas valve so that damper and valve open and close simultaneously.

3. Throttling of the gas only, while the air damper remained fully open was also wasteful of fuel, causing an increase of above 9 per cent in consumption over Method No. 1.

4. Throttling of both gas and air gave good economy, equalling No. 1, but proved impractical for burners of domestic size, as the air adjustment is extremely delicate at light loads.

5. Combined throttling and intermittent control is no more economical than the ordinary intermittent type (No. 1) except *where the heating plant is undersized* and requires hard driving in severe weather. In such cases, some saving can be effected in mild weather by partially closing a valve in the gas supply pipe, adjusting the air damper to match, and relying on the automatic intermittent control thereafter.

6. The superiority of intermittent control of both gas and air, which is the usual type of automatic control, over throttling of gas only, the usual method of hand operation, constitutes a strong argument for the automatic device.

7. Varying the sensitivity of the automatic control showed no effect on operating economy.

*Published as Bulletin 12, by Engineering Experiment Station, Fayetteville, Ark.

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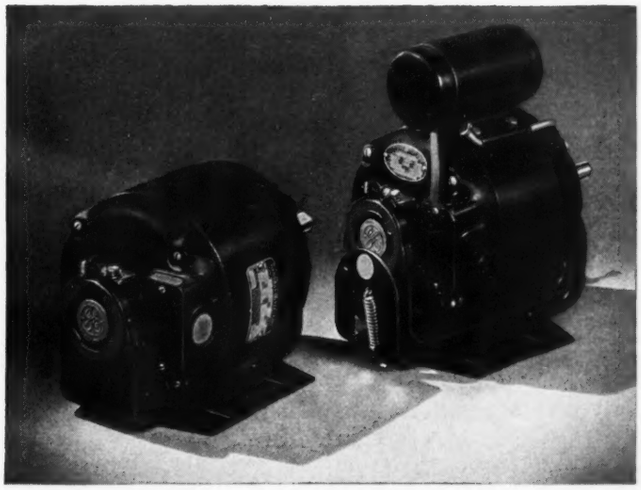

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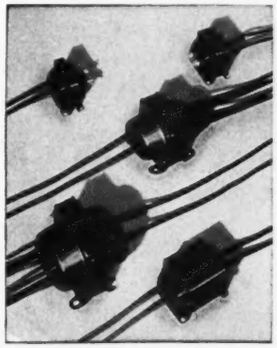

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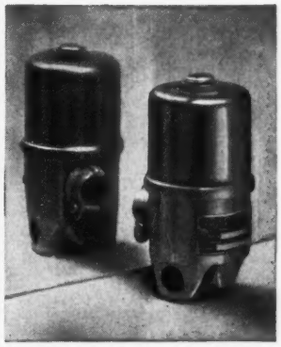

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Konzo—Filter Characteristics

(*Continued from page* 33)

It is of interest to note that the more loosely packed filters have pressure losses which are materially less than the closely packed, viscous-coated fiber types of filters. Data from other sources indicate, however, that in general the more closely packed filters have higher air cleaning efficiencies than do the loosely packed filters. See Fig. 2. There are some exceptions to this generalization.

If three filters had been used in the Research Residence plant as recommended by the National Association of Air Filter Manufacturers, and the total volume of air circulated had been maintained at 1675 c.f.m., the air passed per filter would have been 558 c.f.m.

At 558 c.f.m. per filter it may be noted that the most loosely packed filter, No. 6, gave a pressure loss of 0.02 in. of water, and the most closely packed, No. 2, a pressure loss of 0.065 in. of water as compared with the total loss of 0.17 in. of water that would have occurred for the whole system if 1675 c.f.m. had been circulated without filters installed. In this case the closely packed filter would have produced an additional resistance of 38 per cent of the original resistance in the system and the most loosely packed filter would have added a resistance equal to 12 per cent of the original. In any case it is evident that if the use of filters is contemplated, allowance should be made in the design of the system, and information in regard to the resistance should be available for the different types of filters in common use. This is even more evident when the effect of dirt accumulation on filter resistance is studied.

Effect of Length of Service

The results of the service test of filter No. 1 made over a period of 26 days of continuous operation under normal heating conditions are shown in Fig. 3. In this case, the fan was operated intermittently under control of the room thermostat in response to the heat demand on the house. During the running periods, the fan operated at a speed of 440 revolutions per minute, and the quantities shown in Fig. 3 are those existing

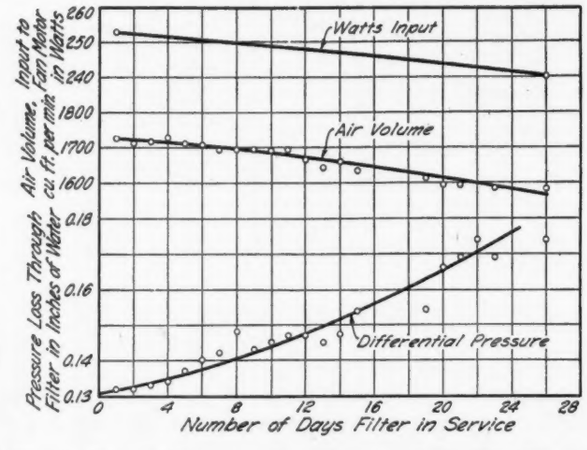

Fig. 3—Rate of increase air resistance of air filter No. 1 with service

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during these running periods. It is apparent that, due to the accumulation of dirt in the filter, a progressive increase in the resistance of, or pressure drop through, the filter occurred. In the 26 days this pressure drop increased from 0.13 in. of water to 0.18 in. of water, or an increase of 38 per cent. With the fan operated at constant speed, the volume of air delivered decreased from 1725 c.f.m. to 1575 c.f.m., or a decrease of 9 per cent. During this period of operation, the face velocity at the filters varied from 310 ft. per min. to 283 ft. per min. and the cu. ft. of air per filter varied from 862 to 787. If the quantity of air circulated had been limited to 600 c.f.m. per filter, the total pressure loss and the rate of increase of the loss would undoubtedly have been less. Since the fan was operated at constant speed, the increase in pressure in the system and consequent decrease in air delivery tended to unload the fan motor. Hence the electrical input decreased from 253 Watts to 240 Watts. With the decrease in air volume and decrease in load on the fan, a slight increase in register air temperature occurred to offset the decrease in volume.

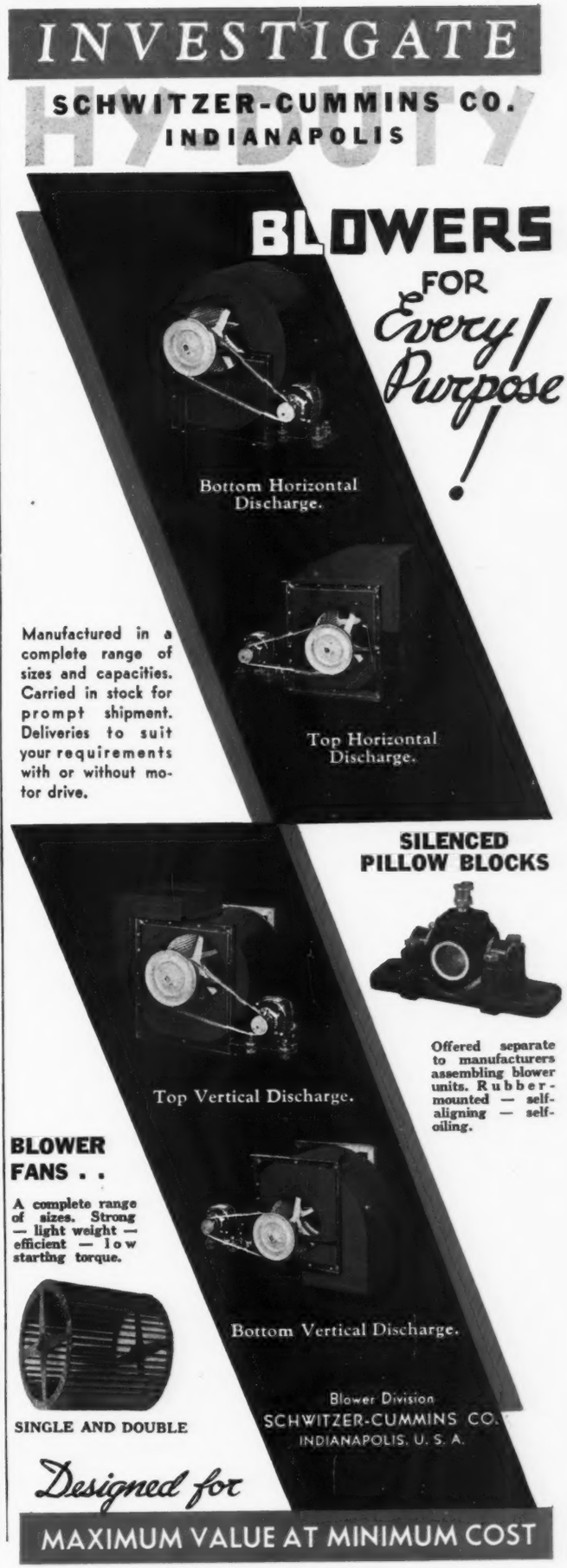
Similar observations on the increase of pressure resistance with the accumulation of dirt on the filters have been reported by F. B. Rowley. (See "The Dust Problem in Air Conditioning," A.S.H.V.E. Journal Section, June, 1935, in *"Heating, Piping and Air Conditioning."*) These results show that the pressure difference across one type of filter increased from 0.10 in. to 0.20 in. with the accumulation of 170 grains of dust. Pressure differences across another type of filter increased from 0.20 in. to 0.40 in. with the accumulation of approximately 100 grains of dust.

These results from the Research Residence and Rowley emphasize the importance of making an allowance for the "dirtying" of filters in determining the pressure loss through filters to be used in a forced-air system. In the previous month's article, the author recommended that for "service conditions" the pressure differences for clean filters should be multiplied by two. Such values were listed in Table II of the previous article. (See item C).

Effect on Plant Operation

It is appropriate at this point to discuss in more detail the effect on the operation of the heating plant when the filter resistance is increased by the accumulation of dirt. The data shown in Fig. 3 gives a graphical picture of the change in resistance and its effect on the air delivery. The accumulation of dirt on the filters and the consequent increase in filter resistance is accompanied by the following phenomena:

1. The increase in filter resistance imposes a larger resistance on the fan, thus decreasing fan delivery. (For conditions of constant fan speed.)
2. The decrease in fan delivery will in most cases tend to unload the fan (See Fig. 3) so that the electric power requirement for the fan motor will be smaller. Therefore, there should be little danger of overloading the fan motor.
3. The decrease in air volume through the furnace system will, for any given combustion rate, cause the air temperature leaving the furnace to increase. The efficiency of heat transmission from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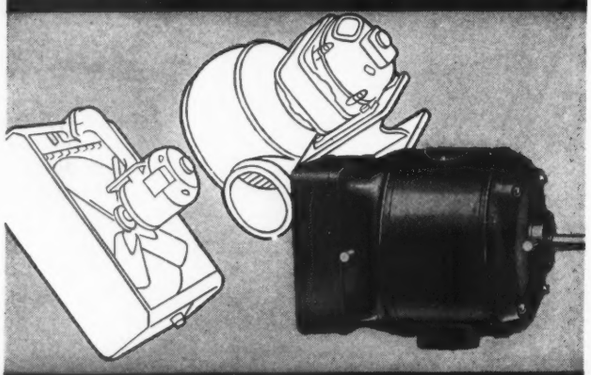

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the surface of the furnace to the moving air will be decreased slightly.

4. A moderate decrease in air volume, which is compensated to some extent by a corresponding increase in air temperature, will not cause much difference in the length of time that the fan is required to operate for any given heating demand.
5. If, however, the filter resistance is allowed to build up to the point where the air delivery of the fan is only a small proportion of the normal air delivery, then serious disarrangement of the plant operation may occur. The accompanying signs of distress will be evident in a hot casing, high air temperature, hot furnace and smoke-pipe, and small air delivery at the register faces. It is good practice to inspect and service filters at least once a year.
6. Ordinarily, however, the moderate changes in air volume caused by an increase in the filter resistance will not create any appreciable difference in the control and maintenance of the house temperatures. It is very fortunate indeed for the installer that the warm-air furnace has such a flexibility that a decrease in air volume automatically causes an increase in air temperature.
7. It should be noted in this respect that when air is passed over surfaces having *fixed* temperatures that a decrease in air volume is *not* compensated

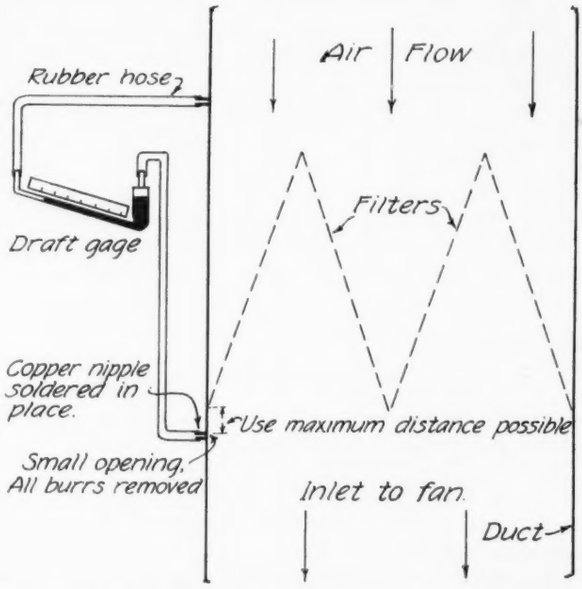

Fig. 4—Line diagram showing permanent insertion of pressure tips, or nipples, for measurement of filter resistance

by a corresponding increase in air temperature. As a consequence any decrease in air volume in such installations will be immediately reflected in a decrease in the overall heat transmission. For instance, in installations using steam coils for heating and water coils for cooling, it is imperative that the filters should be frequently inspected and cleaned.

8. As an aid in observing the progressive increase in filter resistance, the author recommends the permanent insertion of pressure taps above and

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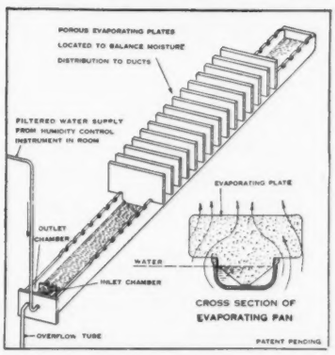

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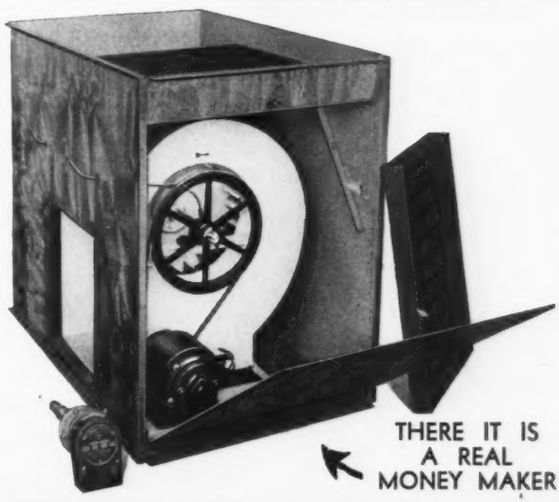

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One of the chief essentials of success in dealing in air-conditioning sales is to have a line that is complete. Trane offers a proved line of products that fit your every requirement and one which enables you to meet any specification. Whether it be 1—the Large Capacity Cooler for big installations; 2—the Climate Changer for residential work; 3—the Product Cooler for product storage; 4—the Propeller Unit for small store work; or 5 and 6—De Luxe Floor and Ceiling models for residential or office work you require or just TRANE Coils for central systems, you will find that they have been tested on recent installations and found satisfactory in every way. Why not check below the unit that interests you and write for complete information.

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below the filters. Either a permanent or temporary draft gage can be installed as shown in Fig. 4.

General Comments

The following comments on various phases of the subject of air filters are of interest:

1. The present tendency towards the use of a greater number of filters is in the right direction since:
   a. The initial pressure resistance will be lower.
   b. The dust holding capacity will be greater.
   c. The rate of increase of pressure resistance will be smaller, and
   d. The period between servicing of the filters will be increased.
2. The industry requires additional information in regard to the air cleaning efficiency of air filters. A committee of the American Society of Heating and Ventilating Engineers has been engaged in the difficult task of formulating an acceptable test code for filters. F. B. Rowley summarizes the difficulties of such determinations in his paper which was referred to earlier in this article. At the present time there is available the "A.S.H.V.E. Standard Code for Testing and Rating Air Cleanin Devices Used in General Ventilation Work" which serves a useful purpose and should be utilized by all filter manufacturers.

Pollen Elimination

3. The elimination of pollen from the air for the relief of hay fever sufferers has been studied by many medical investigators including Dr. Nelson and his colleagues at the University of Illinois Medical School. (See "Air Conditioning in the Treatment of Pollen Asthma," Aug., 1934, *Heating, Piping and Air Conditioning,* p. 329-331.) It is apparent from these studies that many factors enter into the problem and that sweeping generalizations in regards to the causes and cures of hay fever and asthma can not be made. It is of interest to note in the Illinois Medical School installation that especial precautions were necessary in making all joints and the filter completely air tight and leak proof, so that all the air handled was forced to go through the filters.

   In these tests one set of filters was used to filter the incoming fresh air and a second set of filters was installed for the mixed fresh and recirculated

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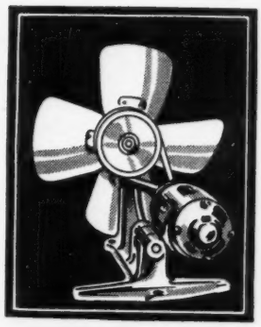

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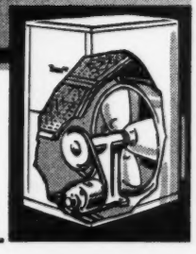

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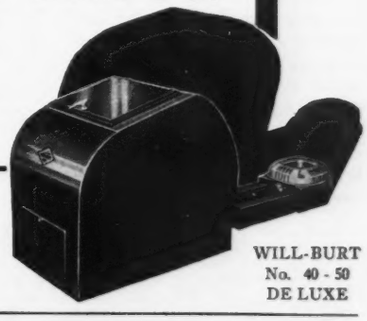

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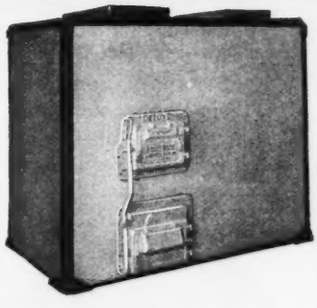

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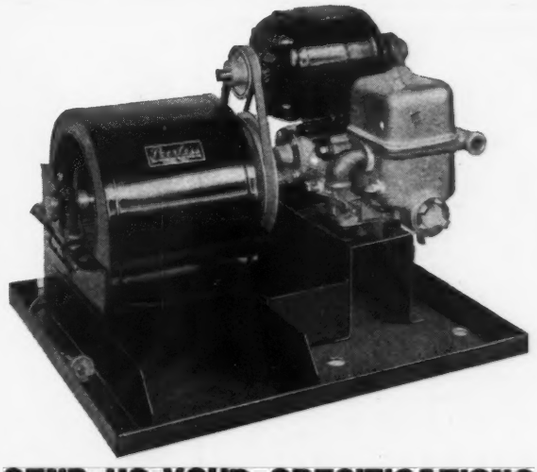

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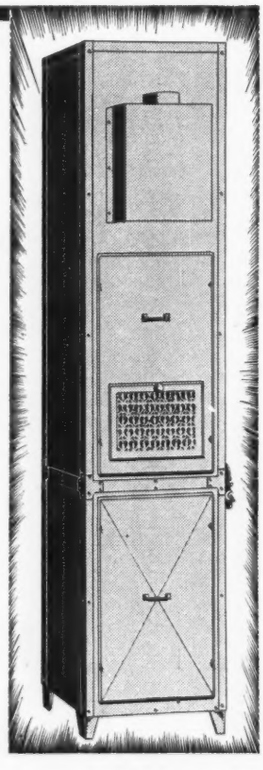

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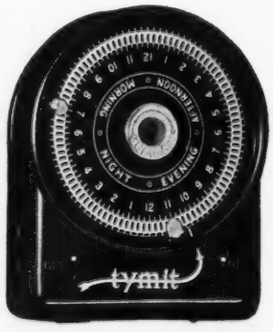
air. The results obtained in this very complete installation showed filtration efficiencies of the pollen content of the order of 98 per cent. The fact that such efficiencies can be obtained by proper installation show that filter systems may be increasingly recommended in years to come by the medical advisor.

Filters in Gravity Systems

4. The use of filters in a gravity warm-air installation has been proven feasible by tests conducted by Professor Rowley. However, such installations should only be made in very freely circulating systems and under conditions which will allow the use of a large number of loosely packed filters. Catalogs from two prominent filter manufacturers recommend the use of a total filter area equal to at least four times the area of the warm-air leader pipe area. In other words for a plant having 600 square inches of leader pipe the filter area should be at least 2400 sq. in., which would necessitate the use of six filters each 20 in. by 20 in. in dimension. Incidentally, the initial cost of installing six or more filters in a filter box may be a determining factor in many cases as to whether filters will be used.

   In any case, the author does not recommend the use of closely-packed filters in gravity installations unless adequate provision is made to safeguard the furnace from overheating. A bonnet thermostat should be provided so that the furnace damper will be closed whenever the air temperature in the bonnet exceeds a pre-determined temperature. In case the filter resistance should build up beyond a desirable value, the house will fail to heat, but at least the furnace will be protected from damage. All filters in such installations should be inspected and serviced at least once a year and preferably more frequently.

5. A close inspection of the dust accumulation on the front side of the filter reveals the presence of a large amount of coarse dust and lint. This suggests the possible use of a primary loose-pack filter for catching large dust particles, such filters being cleanable by tapping, together with a secondary fine-pack filter on the down-stream side for retaining the finer dust particles.



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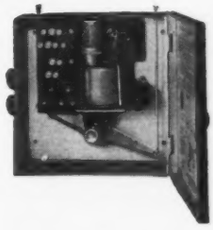

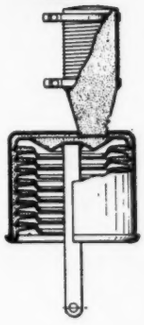

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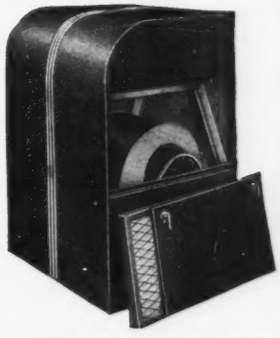

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Converting Gravity Plants

(*Continued from page* 30)

Hence, one of these combinations would be selected as the design basis for the remodeled system. Which of the six should be chosen is a matter of personal opinion; there's no definite agreement among experienced fan heating men as to either the most desirable register temperature for forced air heating, or the most desirable air velocity in the ducts. If a new furnace is to be installed when the system is revamped, by all means consult the furnace manufacturer as to velocities and register temperatures; otherwise if you're in doubt, ask the manufacturer whose blower you are using.

Even though you may *prefer* to design your jobs whenever possible for a register temperature of about 140° or 145° and an air velocity in the risers in the neighborhood of 500 f.p.m. remember that in remodeling old plants there are practical considerations which may prevent the use of your favorite design basis. Don't let your preference (or prejudice) beat you out of a sale if you can land the job by using some other *reasonable* basis for design.

That's what engineering is for. Anyone can easily design a mechanical system if he learns and sticks to one invariable rule, but no such rule has ever yet been formulated which will adequately cover all cases. If you expect to make sales, you must learn to deviate when necessary, from your preferred methods. And it's perfectly right that you should, so long as you steer clear of freakish design and "trouble jobs."

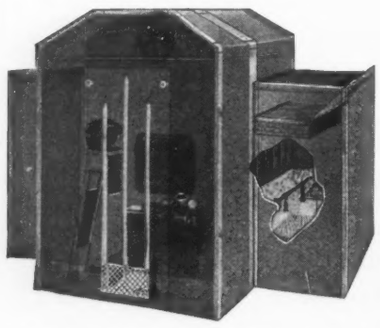
If your preference is for an air velocity of 500 f.p.m. in the ducts, you may frown on velocities as high as 600 to 700 f.p.m. but that doesn't alter the fact that many hundreds of plants are operating satisfactorily at these higher velocities. You may not like to design a job on the basis of a register temperature higher than 145° in which case you would perhaps be surprised to know how many systems designed for temperatures as high as 160°, 170° and even 175° are really working nicely.

TABLE 3

From Mechanical Warm Air Heating Code, 3rd Edition

Air velocity f.p.m.	Register air temperature, degrees Fahr. (return air temperature being 65 degrees Fahr.)						
	120	125	130	135	140	145	150
200	13.7	12.6	11.6	10.7	10.0	9.4	8.9
250	11.0	10.0	9.3	8.6	8.0	7.5	7.1
300	9.2	8.4	7.7	7.2	6.7	6.3	5.9
350	7.8	7.2	6.6	6.2	5.7	5.4	5.1
400	6.8	6.3	5.8	5.4	5.0	4.7	4.4
500	5.5	5.0	4.6	4.3	4.0	3.8	3.5
600	4.6	4.2	3.9	3.6	3.3	3.1	3.0
700	3.9	3.6	3.3	3.1	2.9	2.7	2.5
800	3.4	3.1	2.9	2.7	2.5	2.4	2.2
900	3.0	2.8	2.6	2.4	2.2	2.1	2.0
1000	2.7	2.5	2.3	2.2	2.0	1.9	1.8

We haven't space in this article for a pro-and-con discussion of air temperatures and velocities. This subject is important, however, and will be considered further in the next article. Meantime, for a conversion job like the one we are considering here, it is safe to say that if you select a combination of register temperature



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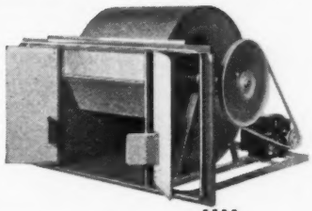

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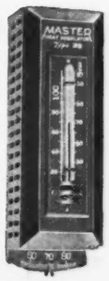

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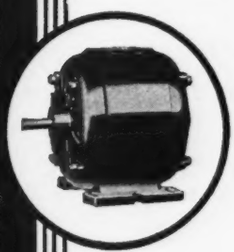

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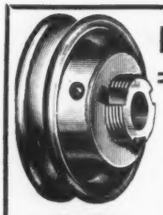

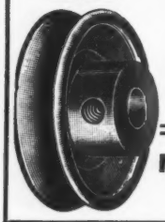

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TABLE 2

From Mechanical Warm Air Heating Code, 3rd Edition

Register air temp.	Factor
150	10.9
145	11.6
140	12.3
135	13.2
130	14.2
125	15.4
120	16.8

and velocity which is about midway between the extreme or limiting values for room "E" and design the forced air duct system on that basis, your duct sizes will be ample. Thus the ducts may be sized for 600 f.p.m. air velocity and a register temperature of 150°. For this combination Table 3 of the Mechanical Warm Air Heating Code shows that the number of square inches of duct area required for each room will be equal to the Room Basic Factor (or heat loss of room in thousands of B.t.u. per hour) multiplied by 3.

A Practical Example

Since the Room Basic Factor of Room "E" which we have designated as the "doubtful room," is 11.9 and our Table 3 Factor is 3, the required duct area is 3x11.9=35.9 square inches and the existing 3-in. by 12-in. riser is large enough.

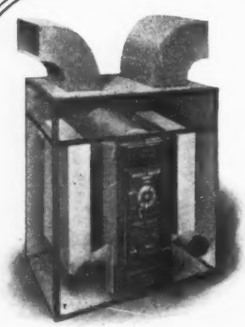
Hence, since room "E" has the greatest heat loss of any second floor room and assuming that all wall stacks are the same size, it follows that for a riser velocity of 600 f.p.m. and a register temperature of 150°, all second floor rooms will be adequately heated if the design of the revamped job is made on that basis.

Thus by figuring the doubtful room only, we have satisfied ourselves that *all* second floor rooms will be heated and we have avoided wasting time figuring the others.

The air volume to be circulated by the plant will be the sum of all the Room Basic Factors multiplied by 10.9 (Table 2, Mechanical Heating Code).

How to Get Code

If you haven't a copy of this Code you can obtain one from the American Artisan or the National Warm Air Heating and Air Conditioning Association, 50 West Broad St., Columbus, Ohio.



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Electric Janitor Damper Regulator, High Limit Control, and Fan Control Combination

INSTALLATION of Automatic Control, essential to every modern warm air heating and air conditioning system is greatly simplified when you use one of the new Minneapolis-Honeywell Control Packages. There is a package or combination for every warm air requirement, each complete in itself and each a matched set complete with all accessories, all at new low prices. Standardize on Minneapolis-Honeywell. You can keep your control stock at a minimum, yet be prepared to render complete service when you carry and install only the leading and accepted line—Minneapolis-Honeywell. Minneapolis-Honeywell Regulator Company, 2726 Fourth Avenue South, Minneapolis, Minnesota. Branch and distributing offices in all principal cities . . . . . .

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Control Systems

BROWN INSTRUMENTS FOR INDICATING, RECORDING, AND CONTROLLING

"How To Get Business" Provides Theme For Indiana's 1936 Convention

IN the face of unusually severe winter weather, topped-off by the greatest temperature drop known in many years, the Indiana Sheet Metal, Warm Air Heating and Roofing Contractors' Association held their Seventeenth Annual Convention at the Lincoln Hotel, Indianapolis, January 21, 22 and 23, 1936. Despite bad conditions, loyal supporters of the association came from all parts of the state to make the meeting one of the liveliest in recent years.

In accordance with the usual Indiana custom, the large meeting hall was divided into spaces where manufacturers and jobbers showed familiar and new products of the industry. All exposition spaces were sold and the general quality of the displays was even better than in former years. In addition to the displays on the convention floor, some manufacturers took additional space, such as welding machine manufacturers, and conducted actual operations with their apparatus.

"Pop" Voorhees

Although not listed on the program, one of the highlights of the convention was the presentation to Oscar Voorhees, "Pop" to hundreds of contractors in Indiana and the Middle West, of a scroll dedicated to the man whose unselfishness, helpfulness, high ideals and integrity have earned the friendship and respect of all who know him. The scroll preceded the gift of a gold watch and chain from the State Association, Furmets of Indiana and the Furtenac Club. "Pop" offered as a slogan for the new year and new conditions—"The pencil is more profitable than the snips."

Opening the program on Wednesday morning, R. Earl Peters, State Director of FHA, described the Real Property Survey which, the speaker stated, disclosed that of 29,000,000 houses in the country 16,000,000 needed repair or alteration. Mr. Peters described in detail Titles 1 and 2 of the Act and made the interesting statement that in Indiana FHA has made 18,500 loans for a total of $5,500,000 and to date has had only seven defaults.

Emphasizing the importance of Title 2 as a basis for new construction, Mr. Peters declared that there exists in the country some $18,000,000,000 of mortgages which fall due periodically every three to five years. One of the principal recommendations for Title 2 of the FHA Act is that this renewal of mortgages is entirely eliminated and the home owner is permitted to assume a mortgage running for a continuous period as long as required according to his financial status. Mr. Peters cited conditions in Indiana and stated that since March 1, 1935, Indiana banks have loaned $6,800,000 and have financed construction on 314 new houses. The speaker gave part of his time to questions and answers.

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Apprentices

Allen T. Hamilton, State Supervisor of Industrial Education for Indiana, addressed the convention on "Apprentice Training." Mr. Hamilton stated that apprentice training generally had been abandoned by all industries at the beginning of the depression and that the situation today is highly serious. In 1930, in Indiana, there were approximately one apprentice to every 443 workers. This proportion has decreased radically since the depression began until today there is only one apprentice to more than 600 workers. Mr. Hamilton explained the Smith-Hughs law of 1917, which provided funds for accredited schools for the training of apprentices either in night schools or vocational training. The speaker emphasized the fact that any employer desiring an apprentice can get a full record of the young man's ability, scholastic standing and general capabilities.

Copper Roofs

"Some New Slants on Copper Roofs," was the subject of an address by Henry Voegeli, American Brass Company, New York City. Mr. Voegeli explained the electroplate method of depositing thin copper in sheet form, known as the one ounce, two ounce, etc., copper sheets. He further explained how construction goes through cycles, such as apartment buildings, houses, theaters, industrial buildings and made the statement that the next cycle will undoubtedly be home construction. The American Brass Company's "Economy Roofing" a ten ounce standing seam copper supplied in 24 by 90- or 96-inch sheets and designed especially for standing seam construction on houses was explained. The speaker related why standing seams should be closer together for appearance on house roofs than on commercial or industrial buildings.

The common faults of copper application were cited by the speaker as: 1, nailing through the copper sheet; 2, soldering all seams; 3, tight dressing of the copper into forms, such as gutters, thereby permitting

no space for expansion. Mr. Voegeli said that where economy copper had been applied the owner generally liked the appearance of the roof and appreciated its appearance, resalability, and lightness (80 pounds to the square) which permits construction no heavier than for composition shingles. The speaker also declared that the common belief that copper roofs are excessively hot, is not borne out by actual tests which indicate that for the copper roof temperatures of 147 degrees are to be expected as against 161 degrees for dark clay roofs. He further pointed out that copper roofs rapidly dissipate heat just as soon as the sun goes down whereas the heavier materials tend to retain the heat for long periods.

In answer to questions from the floor, Mr. Voegeli said that economy copper roofs cost from $12.50 to $13.00 per square and recommended two plies of two ounce over lining felt of 30 pounds or two plies of 15 pounds as a construction for built-up roofs where copper is used instead of felt. He further explained that in built-up roof construction the copper seems to protect the asphalt or tar from the weather and when correctly mopped down hot in the asphalt maintains the plasticity of the binder for many years. Mr. Voegeli said that existing costs for standing seam economy roofing installed in place ran from $10.00 to $29.99 per square.

Better Materials

J. E. Dulweber, Newport Rolling Mill Company, addressed the Thursday morning session on "The Advantages of Better Materials." The main theme of the speaker's talk was the fact that purchasers get just what they pay for and that better materials for our industry cost more just as do better pairs of shoes, better quality neckties, good cigars, branded razor blades and so on down the line through all the thousands of products in daily use.

Just as in all types of merchandise the speaker pointed out that the products used in our field vary in quality and that this variation is generally in accordance with the price. When all costs are accounted for and when the final satisfaction is considered, better materials more than repay for their additional cost, declared the speaker.

Question Box

The question box on the general subject of air conditioning was conducted by J. D. Wilder, Editor of AMERICAN ARTISAN and Arthur Meiche, the Furblo Company. In opening the question box, Mr. Wilder pointed out that up to date too little attention has actually been given to the comfort of the home owner or purchaser. While we have done a great deal of talking about the type of installations we make, we have actually overlooked some of the fundamental principles of comfort, such as cold glass area, stratification, cold floors, drafts. Too often the home owner is led to expect impossible interior conditions and very frequently bad interior conditions are brought about because the contractor overlooked phases of air conditioning which he could have supplied with more intelligent design and installation.

The speaker pointed out that the installation of a furnace did not insure of itself adequate and satisfactory heat. Nor does the installation of a blower guarantee satisfactory air circulation and elimination of stratification. The use of filters does not mean that all the air will be cleaned during the life of the system or during the heating season. Humidifiers are generally installed but do not guarantee that a pre-selected per cent of relative humidity is maintained inside the house. Controls are usually applied to operate the system, but the ultimate value of automatic control is frequently passed by if the installer desires to get the job in and get away as quickly as possible.

Mr. Meiche made the plea that in the present distribution picture the jobber be given more consideration and pointed out how important the jobber is in the storage of equipment, engineering and sales service supplied and in his position as the best qualified person to assist the installer or answer questions. Mr. Meiche cited numerous cases where manufacturers' co-operation had been lacking and where the jobber was the only satisfactory assistant to the installer in need of help.

Attic Cooling

The period was then turned into a question and answer forum. The first question asked related to the cost of mechanical cooling and in reply the speakers cited the Detroit Edison house where costs of 85 cents per 24 hour period were disclosed last summer. This led to a lengthy discussion of the value of attic ventilation as an aid in summer cooling and various speakers from the floor cited instances where in their own homes or in actual installations attic ventilation had proved to be a satisfactory medium. One manufacturer said that in his own home attic fan ventilation had shown itself to be satisfactory as a means of exhausting warm air from the interior of the house and reducing wall, floor, ceiling and furniture temperatures, but that for maximum comfort it had been found that all windows should be closed excepting those in the room which was occupied thus giving a perceptible air movement. The number of air changes possible with basement blowers used for heating as against attic ventilating fans of several types were brought out by citing examples from the Research Residence tests and also tests conducted by individual contractors.

Estimating

E. C. Carter, Editor of Snips, pointed out how Chicago associations have worked for licensing ordinances and have been active in preventing unfavorable legislation in the City Council of Chicago. The speaker cited numerous instances

(*Continued on page* 68)

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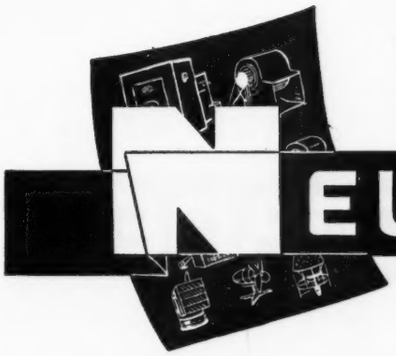


For your convenience a number has been assigned each item. Check the items in which you are interested on the coupon on page 77 and mail to us. Complete information will be forwarded.

● Indicates product not listed in 1936 Directory

△ Indicates product and manufacturer not listed in 1936 Directory

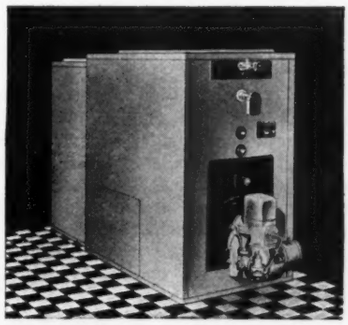
NEW PRODUCTS

1—Oil Furnace

A new warm air furnace unit, consisting of all-steel electric weld construction and incorporating the principle of steel tubes for heat transfer purposes, is announced by the Century Engineering Corp., Cedar Rapids, Iowa. Copper alloy steel is used throughout, the crown sheet and base sheet being 12 gauge, the tubes 10 gauge, the shell 14 gauge. The furnace is designed to obtain the longest possible fire travel with correctly designed areas for expansion and contraction of gases.

The furnace is equipped with a combination firing unit, consisting of a pre-cast, removable combustion chamber, poured into a permanent all-metal combustion chamber drawer, on the front of which is a mounting plate which carries the Model U Century Oil Burner and inspection door opening.

The base of the furnace is con-



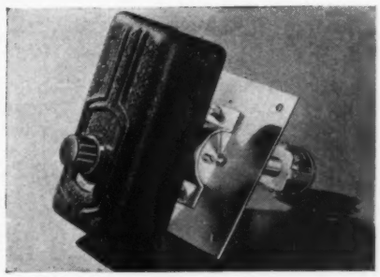
structed to eliminate hot areas at the point of cold air intake. The furnace is enclosed in a square cabinet furnished in a baked wrinkle enamel in several colors.

For forced air heating Century has two units, one having removable filters, and using a vertical motor equipped with the new Russell planoidal blade, the other incorporating a rotary, galvaneel wire drum rotating in a water pan and so designed as to direct all of the air being circulated across and through a film of water. All models are available with or without hot water coils.

Units are available in 3 sizes, with a BTU capacity range of from 117,000 to 285,000 and with nozzle capacities of from 1 to 2½ gallons per hour.

2—Thermostat

A new thermostatic control is announced by the Spencer Thermostat Company of Attleboro, Mass., for bonnet, fan, and duct service for a voltage range up to 250 volts. This new control also incorporates the added feature of an adjustable range and an adjustable differential. The



mounting bracket is swiveled for convenience in mounting.

Mounted with the element in the plenum chamber of the furnace, this thermostat may be used either as a high limit control or as a fan switch to permit the fan to operate only when heat is available.

The corrugated Spencer KLIXON disc is the thermal unit which actuates these controls.

◆

3—Furnace-Fan Unit

A new fan-filter unit, consisting of a four-bladed propeller type fan, placed under 3 sections of filter, in a compact cabinet and operated by a belt driven motor, is announced by International Engineering, Inc., Dayton, Ohio. The housing is 42¼ inches high by 37½ inches long by 25¾ inches wide. Provision is made for bringing cold air into the cabinet either at the top or top rear side. The fan is 24 inches in diameter with four blades, each 11 inches wide, and operates at speeds not exceeding 600 R.P.M. to give 2,341 C.F.M. at the orifice against .32 inches static resistance. The manufacturer furnishes three different sizes of pulleys to give 378, 495 and 600 R.P.M. of the fan. The motor is 110 volts, 60 cycle, ¼ horsepower. A leaflet shows and gives a full description of the design and operation and also presents a chart showing cubic feet per minute delivery against varying static resistances.

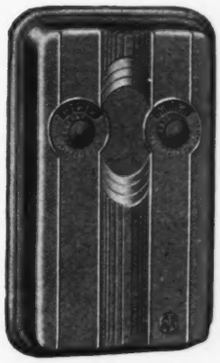
4—Steel Furnace

A new steel furnace is announced by the Rybolt Heater Company, Ashland, Ohio. The furnace will be made in five sizes, ranging from 18½ inches to 30½ inches diameter of grates, and from 509 to 1,163 square inches of leader pipe capacity. The furnace consists of the customary steel drum, lined with firebrick and supporting the grates, together with a gas-tight radiator with V-shape baffle. The front is heavy cast iron attached to the drum without joints inside of the fire chamber. Duplex ball bearing grates are used above a large ashpit section. The steel drum is welded and riveted and the radiator is all welded. A flanged joint with asbestos packing is used between the drum and radiator.

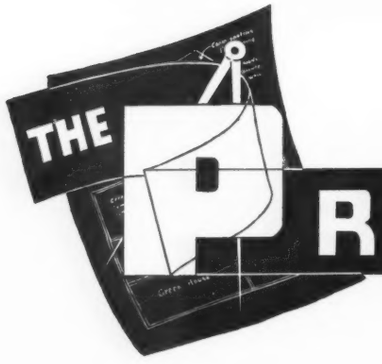
◆

● 5—Instruments

Two new instruments, to be known as the Hytherstat and Comfortrol, are announced by Julien P. Friez & Sons, Inc., Baltimore, Maryland. The internal mechanisms of these two new controls consists of the latest type humidistat and thermostat mounted in one single case. The humidistat portion uses human hair element and the temperature portion a special bimetallic



element. The chief difference between the two instruments is that the hytherstat includes a humidistat and thermostat and governs air conditioning in all four or any two or three of the chief functions of relative humidity and dry-bulb temperature while the Comfortrol has its setting dial so intergeared that the result of the control's operation is in terms of the A. S. H. & V. E. Comfort Chart or in degrees of effective temperature.



THE PROBLEM CORNER

Insulation

American Artisan:

Will you please advise what benefit from insulation is derived by wrapping warm air leader pipes with ten-pound asbestos paper. Our experience leads us to believe there isn't much benefit. Also, is galvanized pipe more efficient than light tin?

F. O. C., Tennessee.

Reply by the Editors

There is no benefit to be derived from wrapping warm air leader pipes with ten-pound asbestos paper. The University of Illinois Engineering Experiment Station investigated the heat loss from various types of leader pipes, both bare and insulated, and reported their findings in Bulletin 117. Briefly the findings were as follows:

The coefficient of emissivity in B.T.U. per square foot per hour per 1 degree F. difference is as follows:

For I. C. tin, bright, not insulated	1.28
For I. C. tin with one thickness of ten-pound asbestos paper.....	2.08
For I. C. tin with three thicknesses of air cell asbestos paper and one thickness of ten-pound asbestos paper	0.56
For I. C. tin with one thickness of air cell asbestos paper and one thickness of ten-pound asbestos paper	0.87
For galvanized iron, Number 28 gauge	1.33
For I. C. tin with two thicknesses of twelve-pound asbestos paper	1.88
For I. C. tin with three thicknesses of twelve-pound asbestos paper	1.79
For I. C. tin with four thicknesses of twelve-pound asbestos paper	1.67
For I. C. tin with five thicknesses of twelve-pound asbestos paper	1.43

You can readily see that bright tin or galvanized iron bare is more efficient than either tin or galvanized iron covered with either ten- or twelve-pound asbestos paper in layers up to and including six thicknesses of paper.

If bright tin or galvanized iron bare has 100% efficiency, it is necessary to use three thicknesses of air cell asbestos (0.56); one thickness air cell and one thickness of ten-pound asbestos (0.87); three thicknesses of air cell asbestos and one layer twelve pound paper (0.57); 1½ inch asbestos fiber, block with cement and cheese cloth (0.33) to obtain any efficiency from insulation. Asbestos paper wrapped in successive layers has no insulation value within an economic number of wrappers.

Answering your last question, there is relatively little difference between bright tin and bare galvanized iron.

▲

Garage Humidity

American Artisan:

How can excessive humidity be avoided in attached garages where forced warm air, humidified, is used from the house system.

J. P. Michigan.

Reply by O. J. Kuenhold, Engineer, Monmouth Products Co.

Considerable moisture is brought into garages by automobiles in winter in the form of snow, ice and frozen mud. This melts, forms puddles and in general exposes a considerable wet area, the effect of which is to moisten the air. The metal parts of the car being cold when the car enters the garage and remaining cold for a considerable period, easily condense moisture out of the air even though the per cent of humidity is low.

When the garage room is heated from a central conditioned air heating plant, the air that is blown into the garage room to warm it, being moistened, adds from 20 to 40 grains of moisture to each pound of air in the garage. If the garage is warmed to, for instance, 40 degrees, this will increase the relative humidity already existing in the garage rooms from 35 per cent points and upward well beyond the point at which moisture will condense, not only upon the automobile, but on walls, ceiling, floors, etc.

To draw air from a point on the furnace ahead of the humidifying pan makes no appreciable difference. There is only one remedy and that is to warm the garage space by an independent air circulating heater placed in the garage room and gas fired through a thermostatic valve set to maintain 40 to 45 degrees day and night. Such a heater will warm the garage at less than the cost of warming it from a central furnace and with much greater certainty and at the same time do an effective job of keeping the garage space and the automobiles in it dry.

In addition to the above advantages for warming garage rooms independently of the main heating plant, there are other very important advantages, such as a possible reduced size of the central furnace and blower, simplified duct lay out, hence better heat distribution to all rooms of the house.

Bear in mind that garage rooms require most heat during the night when the furnace is checked down and require no heat during a considerable period of the year when heat is required for the house. Also remember that air forced from the main heating plant into the garage cannot be returned, but must be expelled from the garage. These factors greatly increase the cost and complications of warming a garage room from a main heating plant.

▲

Hot Casing

American Artisan:

We recently installed a heating plant and it is the first one of 200 which is not entirely satisfactory. We used a steel furnace made by Henry Furnace and Foundry Co. Although we are sure we have ample cold air we do not seem to drive the heat out of the furnace. Instead, the casing near the cold air shoes gets hot. Have you any suggestions?

M. V. L., Wisconsin.

Reply by the Editors

We think it improbable that the furnace you describe is not in itself satisfactory, but we do feel that probably there is some difficulty in the general layout of the system.

We say this because we have checked a number of furnace installations running hot and in most cases find the trouble is due to a lack of return air. Just because the return air system shows adequate schedule inches is not sufficient proof, we find, that there is return air circulation.

We suggest that you check the layout and the system and make sure the return system is unrestricted throughout.

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News Items . . . . . .

Michigan State Annual Meeting

The 1936 Annual Convention of the Michigan Sheet Metal & Roofing Contractors' Association will be held in Detroit, March 3, 4 and 5. Full information on the program will be ready within a short time. Readers desiring preliminary information should write Frank Ederle, Secretary, Chamber of Commerce Building, Grand Rapids, Michigan.

◆

Ohio State Convention March 10, 11 and 12

The convention committee of the Ohio Sheet Metal and Roofing Contractors' Association announce that the Ohio Annual Convention will be held March 10, 11 and 12, 1936 in the Biltmore Hotel, Dayton, Ohio. An excellent location has been secured with exhibit space around the meeting floor. Spaces approximately 10 feet by 10 feet will be available for display. Full information on display space prices and locations may be obtained by writing R. E. Barrett, Secretary, Ohio Convention Committee, 340 Huron Avenue, Dayton, Ohio.

◆

Warm Air Heating Short Course

Announcement is made by the Technical Educational Committee of the National Warm Air Heating and Air Conditioning Association that the Fourth Annual Short Course of Warm Air Heating and Cooling will be held at Michigan State College, March 31 to April 3 inclusive as formerly under the auspices of the association and Michigan State College.

The four-day course will give all the theory necessary to make calculations for a complete air conditioning installation in an insulated home. As in former courses, information will be given in practical form to the students and data will be based on the 1935 Guide. Instructors will be practical men from the industry well versed in their particular subjects.

The cost of the course is $2.00 for registration fee and room and meals will cost those attending according to their wishes. Anyone desiring to register for this school should write immediately to Professor L. G. Miller, Department of Mechanical Engineering, Michigan State College, East Lansing, Michigan and enclose $2.00 for registration.

◆

New York State Convention April 27 to 29

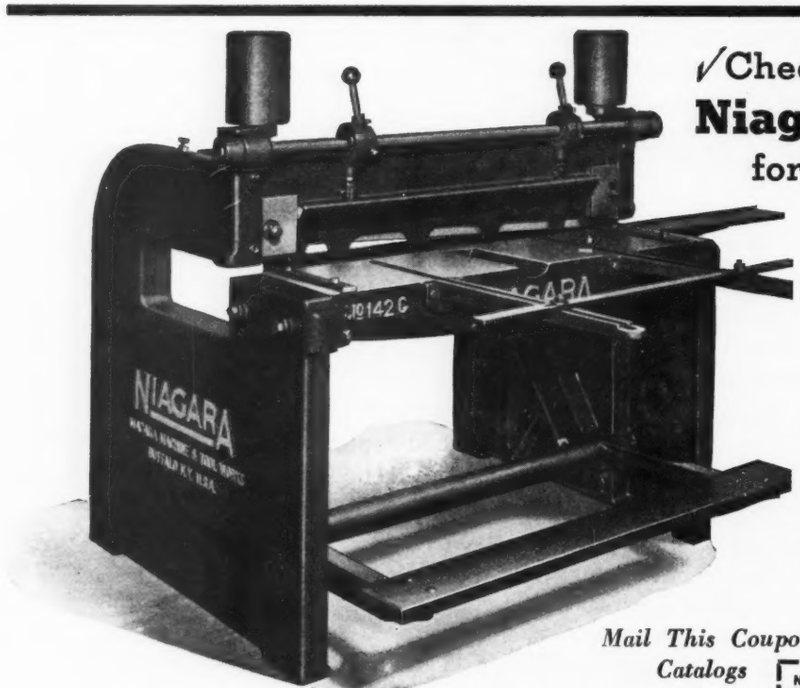
The New York State Sheet Metal, Roofing & Air Conditioning Contractors' Association, Inc., announce that the 1936 Annual Convention will be held in the Hotel Onondaga, Syracuse, New York, April 27 to 29 inclusive.

The program committee reports that in view of the continued assertions of manufacturers and jobbers that the sheet metal contractor is a good mechanic but a poor merchandiser the first day of the convention has been set aside for manufacturers to show the industry how to overcome this fault. Programs of the convention will be ready for distribution shortly. Anyone desiring information before publication of the complete program should address Adolph Hesse, Secretary, 916 Columbia Street, Utica, New York.

◆

Chicago Central Committee Elects Officers

The Central Committee of Sheet Metal and Furnace Associations in the Chicago area held its annual election of officers January 16. Officers elected were: President, Paul M. Barth; Vice-president, Louis Drehobl; Treasurer, John Novak; Secretary, J. A. Miedema. Supply trade members: Walter Joy, Republic Metals, Inc.; Ray Lorenz, Chicago Furnace Supply Co.; D. C. Ellison, Northwestern Stove Repair Co.; Art Meiche, Furblo Co.; Reid Mackin, International Heater Co.; Don Grace, Chicago Steel Service Co. Honorary member, E. C. Carter of Snips.



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Wisconsin Emphasizes Practical Business Stimulants at 22nd Annual Convention

THE Twenty-second Annual Convention of the Sheet Metal Contractors' Association of Wisconsin held February 3-4, at the Republican Hotel, Milwaukee, experienced weather which prevented many members from attending, but still attracted an excellent group of members and guests who enjoyed a program both practical and informative.

Assn. Activities

After the appointment of convention committees, Louis Drehobl, President, Furnace and Sheet Metal Institute of Chicago, speaking on the benefits of association membership, declared—"An association is only as good as the benefits it offers to members." Mr. Drehobl declared that the Chicago Furnace Institute had been so organized and that proof of the value of such a program was evidenced by the fact that membership in the Chicago association had increased tremendously and continuously. The speaker outlined the gravity and forced warm air heating schools recently concluded and the cost accounting and bookkeeping school now in process. The speaker stated that the next program of the Institute would be a sales school wherein members will be taught how to advertise, make sales, canvass, close sales, in short, how to sell their engineering and experience. "These activities of the Chicago association," declared Mr. Drehobl, "furnish I believe the reasons why association membership is valuable to every contractor. Further, this report of the Chicago association work indicates that membership can be increased and retained if the association has something of real value to offer its members. The time has come when contractors must take advantage of every possible opportunity to increase their engineering, sales and merchandising experience and knowledge and association membership offers this knowledge in its most practical form."

In the absence of Otto Guessenhainer, past president and life member of the Wisconsin association, R. F. Jeske read a manuscript from Mr. Geussenhainer in which he declared that work the industry once enjoyed has gone and that crying over the situation is a waste of time. Mr. Geussenhainer pointed out that 75 years ago kitchen utensils and all kinds of sheet metal work in creameries, breweries, canneries and other industries was fabricated and installed by the local sheet metal contractor, but that today these products and these services have been replaced by the fabricator who produces a better product at a cheaper price. The same situation prevails in tin roofs, which have been largely replaced by composition roofs and in cornices which, because of changes in architecture, seen to have gone forever. Air conditioning, said Mr. Geussenhainer, seems to be the only new activity.

President — Palmer Hanson, La Crosse.
First V. Pres.—A. Gehrke, Shawano.
Second V. Pres.—H. H. Peters, Milwaukee.
Third V. Pres.—Wm. Marth, Milwaukee.
Fourth V. Pres.—F. Wenger, Kenosha.
Fifth V. Pres.—R. Behn, Kenosha.
Treasurer—Alfred Goethal, Milwaukee.
Secretary—Paul F. Biersach, Milwaukee.
Sergt. at Arms—Frank Kramer, Milwaukee.

Mr. Jeske added as his own remarks that manufacturers and fabricators of items which the local contractor used to make seem to be here to stay. Brewery equipment, skylights, tin roofs, ventilators, where such work has been lost might have been held by intelligent effort.

Workmen's Insurance

H. Herman Rauch Director, Unemployment Compensation, Wisconsin Industrial Commission, speaking on the subject of "Unemployment Compensation Insurance," declared that compensation insurance is only one of many new social activities which have become a part of social engineering. "Today we have at least 3000 times the man power used in the construction industry of ancient Rome. We do not want and we cannot get rid of machines, but machines have brought unemployment and old age dependability," declared the speaker. "In olden times before machine operation, each man was his own business and had no unemployment. Today we depend upon machines, wages and investments and have unemployment when any one of these activities slack off. We have today in this country more old men and women than formerly and the number is increasing. Industry does not wish to employ the man 65 years of age; therefore; the public must take care of him if he is dependent."

Mr. Rauch explained the many provisions of the Wisconsin act covering unemployment and compensation insurance. The editors suggest that anyone interested in these provisions of the Wisconsin laws should address Mr. Rauch at Madison, Wisconsin.

Labor Jobbers

In the absence of Edwin A. Scott, editor of Sheet Metal Worker, New York City, Secretary Biersach read a paper which Mr. Scott had mailed in. Mr. Scott made the point that sub-contracting has become a serious problem particularly where large equipment manufacturers sublet the sheet metal work and take the profit from the apparatus. In this situation the sheet metal contractor becomes merely a labor jobber and is deprived of a legitimate profit from the apparatus.

"The situation," declared Mr. Scott, "has given rise to the problem of just who is responsible for any particular piece of work. The manufacturer of apparatus passes

the buck to the contractor, who in turn passes the buck back to the manufacturer. Owners are beginning to appreciate the need for a contract which completely covers the work done and one of the big problems of the near future is to definitely settle this situation."

Questions to Answer

J. D. Wilder, Editor of AMERICAN ARTISAN, speaking on the subject "Questions for Which We Find No Answers," raised the question of what to do about certain conditions which are becoming more acute. Among these conditions were the following: Merchandising. Mr. Wilder stated that speakers appearing before conventions exhorted listeners to do a better job of merchandising whereas the real problem was to get into such meetings those contractors who do not attend, but who need merchandising information more than do the dealers who attend.

The speaker declared that FHA has proved to be one of the soundest pieces of legislation from the New Deal and that contractors should work for its extension beyond April 1, 1936. The problem for which we can find no answer in this connection is—"Why should such items as electric refrigerators be permitted for loaning purposes under FHA?" "FHA", declared the speaker, "was designed to aid the Construction Industry and the electrical refrigerator manufacturers are the last group in the country who need assistance."

The speaker raised the question—"Why should our large manufacturers be permitted to become business octopuses extending their operations into practically every field even though they had no previous experience in such fields and to date have shown little aptitude for successful operations in fields like air conditioning."

Carrying further the description of apparatus at the exposition, the next question was—"What will our industry do about the manufacturers of oil burners who are now making oil burning furnaces and oil burning boilers?" Many of the units shown at the show seem to have been designed because some oil burner competitor had a product of this type. Further, such manufacturers will not ordinarily turn to our industry as the means of distribution and we may find ourselves up against a class of competition with which we will not know just how to deal.

As a concluding problem, the speaker raised the question of local and state ordinances or licensing agreements whereby contractors in this field would be compelled to abide by established rules and regulations for the design and installation of gravity, force warm air and air conditioning installations. The speaker declared that this use of licensing agreements seem to be the only feasible solution to many of the problems of inadequately designed and improperly installed work.

Advertising

E. C. Carter, Editor of Snips, displayed a board on which was fastened many types of advertising and publicity material used by contractors in the Chicago area. An example was cited where Charles Gatz of Gary, Indiana, secured many column inches of space in his local newspaper reporting that he had attended the Indiana State convention for the specific purpose of obtaining information which would enable him to install better air conditioning systems in Gary. Contractor Shubert, in the Chicago area, gives away bunco and bridge score cards to groups and has found this type of advertising profitable. Contractor Parker of Rockford, Illinois, sends letters to six home owners on each side of each job and to twelve home owners across the street, pointing out that an installation is being made and inviting these home owners to inspect it. Louis Drehobl of Chicago sends a form letter to all of his old customers and prospects at regular intervals and has found this effort to retain old customers very profitable.

Mr. Carter pointed out that the Chicago Furnace Institute placed cooperative advertising in a local Chicago newspaper and that not one dime's worth of business had resulted. Self advertising, such as the tin shop-on-wheels of Homer Selch in Indianapolis, or the newly remodeled front for Contractor Tolg of Waukesha, Wisconsin, or the sheet metal man on a sheet metal horse of S. M. Harris in Hammond, were cited as good examples of personal advertising. Placing decorated trucks in parades as followed by Bud the Furnace Man in Hammond, Indiana, the use of attractive outside signs, such as the Contractor Schoolcraft, Indiana, uses and the contest letters for prizes by Puhl and Heffer of St. Louis, were given as successful sales and advertising methods.

Mat Friedman of National Sheet Metal Contractor declared—"No industry has God-given right to work." Success in business today is a survival of the fittest. Large companies with good products plus aggressive sales programs are rapidly becoming a serious problem. The only solution is equally aggressive advertising and sales work on the part of the independent dealer.

H. E. Voegeli of American Brass Company, speaking on copper roofing, delivered practically the same address as reported in the Indiana State Convention program in this issue.

Ventilating Code

C. H. Randolph, Chairman of the Wisconsin State Committee for the Revised Heating and Ventilating Code of Wisconsin, read excerpts from the proposed code, which was open to hearing last week. One of the important changes is that as revised the code covers all public buildings and places of employment, both new and old, without exception.

Under the revised code outside air is now set at a sufficient quantity to maintain specified inside conditions with a minimum of 10 c.f.m. per occupant where air is filtered and 7½ cubic feet per minute per occupant where air is washed or refrigerated. The revised code definitely lists some fifty special places where c.f.m.'s may vary from this amount. For air movement, the total air circulation shall not be less than 30 c.f.m. per occupant or 6 air changes per hour, the largest quantity to govern. Automatic temperature control shall be provided for practically all places covered by the code. Approved air cleaning devices must be included in the installation. For exhaust hoods, 100 feet per minute for single hoods and 250 feet per minute for double hoods are specified. Material gages for ducts of various sizes as specified in the new code with the further provision that

(*Continued on page* 64)

News Items . . . . . .

New Officers of Master Furnace & Sheet Metal Ass'n.

For 1936, the following officers will serve the Master Furnace and Sheet Metal Association of Chicago: President, R. Chorley; Vice-president, Wm. Kirby; Secretary, Jack Titterington; Treasurer, John Serson. Directors: A. L. Nelson, Emil Woodstrup, Fred Hall. Central Committee Delegates: Paul Barth, E. Nemec, R. Chorley. Alternates: J. Titterington and Wm. Kirby.

According to the secretary's report and the report of the board of directors 1935 was a highly successful year in the history of the association. The group co-operated with other organizations in the Chicago area in preventing the passage of detrimental legislation and in raising the general level of installation work. According to the new officers, the excellent progress of 1935 will be continued in 1936 with the co-operation of all members.

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Death of Francis H. Mason

Francis H. Mason, Manager of the Furnace Filter Division of American Air Filter Company, Inc., Louisville, Kentucky, died December 25 of a heart attack while on a business trip. Mr. Mason had not been in good health for the past year, but his illness had not been considered so serious.

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Roofing Conference

It was voted at the 1935 Conference to confine the invitations for the 1936 Conference only to organizations in these industries and to ask them to send delegates, but also to include any roofing and sheet metal contractors who are doing Government work or who are interested in promoting and protecting the trade from a national and regional viewpoint. Organizations are asked to advise at the earliest possible date that they will be represented and as soon thereafter as practicable the names of their delegates.

The tentative dates selected for the 1936 Conference are March 2nd, 3rd and 4th; allowing the first day for presentation of issues; the second day for conferences of any individual groups who may discuss same individually; then all returning to joint session the third day for final action.

Warner S. Hays, Conference Chairman.

◆

Install Air Conditioning

J. T. Hornibrook, tinners and roofers, 209 E. Markham St., Little Rock, Ark., recently installed a year 'round air conditioning, heating and ventilating system and all the sheet metal work on the new home of Frank Silverman.

◆

President Willard Honored

Dr. Arthur Cutts Willard, President of the University of Illinois, Urbana, Ill., was awarded the F. Paul Anderson Gold Medal by the American Society of Heating and Ventilating Engineers for distinguished scientific achievements in the field of heating, ventilating and air conditioning at the 42nd Annual Meeting of the Society held in the Palmer House, Chicago, January 29, 1936.

The Committee on Award honored Dr. Willard for his outstanding work as an engineer, a teacher and an author in the fields of heating, ventilating and air conditioning; for his outstanding service as a consultant on the ventilation of the Holland Tunnel, the United States Capitol and the proposed Chicago Subway; for his outstanding work in research and for the service he rendered to the Society as a member, as an officer and as technical adviser to its Committee on Research.

◆

Contractor Wants Furnace Agency

William E. Knipe, 2234 Beeler Street, New Albany, Indiana, writes that he is interested in securing an agency for a good competitive line of furnaces. Mr. Knipe does all types of sheet metal job work, also roofing of all types and metal ceiling erection and skylight construction.

"'How far is UP?', the smart ones used to ask. Today this stratosphere balloon gives them the answer in exploring for useful scientific knowledge...72,395 feet is UP... think of it...14 miles UP...where the air just isn't and things are inky black. In other words, that's the UP-to-date."

"..and here too, Pop..

THEY WENT UP WHERE THINGS ARE INKY BLACK"

• "To weld, they just press a button—the electric arc of their new Lincoln Sheet Metal Welder does the work. It's always on hand—never any delay. And it costs less than a nickel an hour to use. What better way is there to the black ink of profits?

"No need to pass up profitable jobs when you have one of these new welders. Sheet metal—as light as 24 gauge—is welded easily without warping. Also galvanized iron, stainless steel, copper, aluminum, as well as heavier material such as angle iron, plates and other shapes.

"For as little as $250 you can buy one of these Lincoln welders. Get its savings now! Cast off the shackles and rise to the shekels with Welding Headquarters aboard!" THE LINCOLN ELECTRIC COMPANY, Dept. EE214, Cleveland, Ohio. Largest Manufacturers of Arc Welding Equipment in the World.

★ MAIL THIS COUPON TODAY ★

THE LINCOLN ELECTRIC COMPANY, Dept. EE-214, Cleveland, Ohio

Gentlemen: Please send me full particulars on the new $250 Lincoln welder. I now weld with the electric arc ☐ gas ☐.

Firm _____

Your Name _____ Title _____

Address _____

City _____ State _____

Wisconsin Meeting

(*Continued from page 62*)

on all sheets larger than 18 inches each sheet shall be cross broken. Ducts subject to large heat loss shall have 1 inch of insulation.

Air Conditioning

Edwin A. Jones, Chief Engineer, L. J. Mueller Furnace Company, Milwaukee, speaking on "The Present Trend in Air Conditioning" declared that these trends were best illustrated by the Fourth International Heating and Ventilating Exposition. Mr. Jones declared that the equipment displayed represented millions of dollars of research and definitely showed that manufacturers believe construction is coming back. Reviewing some of the papers delivered at the A.S.H.V.E. meetings, Mr. Jones stated that the comfort chart should be the first step toward securing satisfactory inside conditions. Mr. Jones declared that Houghton's paper proved that 30 to 60 per cent relative humidity at appropriate dry bulb temperatures is satisfactory for summer cooling. Further, that we have placed too much emphasis on dehumidification. This revision means less apparatus and lower costs.

Professor Yaglou's paper on amount of outside air required to provide pleasant indoor conditions, Mr. Jones stated emphasized the importance of odors. The amount of outside air should be determined by the degree of odors encountered rather than by any arbitrary rule covering air amount. He further said that recent tests show filters and surface coils do not remove odors and washers are only partially satisfactory. Mr. Jones declared that one of the most interesting facts proved by the Exposition was the fact that central air conditioning systems for both winter conditioning and summer operation are very definitely favored by the manufacturer, the engineer, the contractor and home owner. Further, the trend in winter air conditioning is to direct-fired heaters and to complete packaged units with fan, furnace, filters, oil burner, stoker or gas with the entire unit matched for performance. Mr. Jones declared that, in his opinion, he did not think split system where radiation and circulated warm air are used are proving popular in new homes but it may be employed extensively in houses already having radiation and boilers.

Mechanical Code

Arthur Meiche, the Furblo Company, briefly discussing the Mechanical Code and its application to forced warm air heating, declared that too many dealers use both the Standard Code and the Mechanical Code only partially and do not think beyond the specified rules of the code. Frequently this results in overlooking such things as cold floors, cold ceilings, changes in register temperature or duct velocity required by the particular conditions of the installation. Mr. Meiche suggested that eight air changes in living and dining rooms or kitchens and four changes for bedroom and baths might be better than the air changes set up by the code.

Our Responsibility

Rudolph Menk, Joliet Heating Corporation, speaking on the subject "The Warm Air Heating Contractor's Responsibility," declared "We are today living in a thrilling period. Our industry occupies the front sheet in the new era of air conditioning. Business has been better in recent months and we seem to be on the upturn of a cycle for greatly increased construction work. Warm air heating at one time did not enjoy popularity but today seems to be well on its way toward general public acceptance as the best type of heat. Our research activity is much farther along than the research of other industries and with proper co-operation between contractor and manufacturer we should be able to keep our research very definitely ahead of the parade. I anticipate future trouble from the direct-selling manufacturer." We should not permit ourselves to become labor jobbers for we are rightfully entitled to the profits from the apparatus as well as to the profits from labor. The question we will all have to answer is—'Who is the air conditioning specialist in my community.' Whether or not we will be the specialist depends upon our own efforts."

Stainless Steel Movie

M. J. Lepo, Republic Steel Corporation, Youngstown, Ohio, introduced the Republic moving picture showing the manufacturer of stainless steel and the many uses of this material. It shows graphically the manufacturing process in stainless steel with additional views of some of the hundreds of products now made from stainless steel and many of the fabricating methods found satisfactory.

Mr. Lepo, in addition to the moving picture, answered questions from the floor covering the characteristics of stainless steel and practical problems, such as methods for soldering, welding, machining and fabricating.

C. J. Daniels had intended to give a practical welding demonstration with the electric arc but due to the fact that the machine was not suited to the electrical circuit in the hotel the demonstration was not possible. The speaker declared that up until a short time ago 16-gage material was considered about as light as practical for welding, but that methods have now been perfected permitting welding of gages up to 28-gage. The speaker recommended small coated rods and suitable small ampere machines for this type of operation. He explained that the temperature at the rod tip was approximately 6500 degrees, which means that the lighter the gage the faster must be the welding operation and the greater the danger of burning through the metal. Welding of galvanized sheets is practicable if the operator understands the necessary process because with the electric arc the high temperature is restricted to a very small area and that does not affect galvanizing in a great degree.

The speaker described many of the operations of welding ducts, hoppers, bins, kitchen equipment, housings and furniture of all types. He also gave considerable information on the various types of joints which can be used for duct work and emphasized the methods to be used to insure tightness, lack of distortion, and strength. Figures were cited showing that welding even on light gages for ventilating work erected in the field is both practical and economical. The speaker gave cost figures gathered from contractors in different parts of the country which indicate that welding is in direct competition with mechanical locks.

New Literature . . . .

For your convenience in obtaining copies of new Literature, use the coupon on page 77.

201—Inclinable Press Bulletin

Niagara Machine & Tool Works, 637 Northland Avenue, Buffalo, New York, announce Bulletin No. 58-E, covering the company's line of inclinable power presses. What this type of press will do, what are its advantages, capacities and speeds are fully discussed. Large illustrations show each machine in this particular line and details of importance. Complete information on each of the machines shown is presented in the form of tabular matter.

◆

202—Refrigeration Compressors Leaflet

Carbondale Machine Corporation, Harrison, New Jersey, announce a new leaflet decribing the company's recently announced vertical duplex type refrigeration compressor in sizes 5 inches by 5 inches and smaller. The bulletin number is 1107. Cutaway views show the general construction of the new line of compressors and detail photographs show the various features.

◆

203—Air Conditioning Catalog

Lewis Air Conditioners, Inc., 1600 Northeast Broadway, Minneapolis, Minnesota, announce catalog 20-A, which describes air conditioning units already on the market and two new series. The catalog shows illustrations and presents tables of sizes, capacities and ratings for the room cooler in large, small and deluxe models; the central system unit for connection to steam or hot water boilers and consisting of heat transfer sections, blowers, filters and complete automatic control; and the conversion unit consisting of a blower, filter and controls for application with existing gravity warm air furnaces.

◆

204—New Williamson Literature

The Williamson Heater Company, Cincinnati, Ohio, has ready for distribution several new pieces of literature describing their line of furnaces.

Catalog No. AA-35-TL describes the Williamson Tripl-ife furnaces, Model AA, in pipe or pipeless types, shows the complete furnace and its parts in detail. Ratings and specifications are included.

Catalog No. A-35 describes the Williamson Model A pipe and pipeless furnaces with illustrations and explanatory text covering all parts of the unit.

A large mailing leaflet, announcing the Williamson Tripl-ife iron used in furnaces which carry a twenty-year written guarantee, shows and explains the guarantee bond with information on what the Tripl-ife iron is and how it works in the furnace. The Model A and Model AA furnaces are also described and shown in small envelope stuffers.

◆

205—Stoker Leaflets

Econocol Stoker Division of the Cotta Transmission Corporation, Rockford, Illinois, announces three new pieces of literature on the company's stoker. One piece of literature is an honor roll of users of Econocol. Another leaflet presents the reasons why stoker operation reduces fuel cost. The third leaflet describes the reasons why stoker operation results in greater economy in household heating.

◆

206—Tool Catalog

The Independent Pneumatic Tool Company have just issued a new catalog, No. 32, which illustrates and presents specifications on the entire line of Universal Electric Tools. This catalog includes the new U-14, small, light weight, portable electric tool. This catalog includes a complete showing of portable drills, screw drivers, hand grinders, bench grinders, nut setters, tappers, saws, and electric hammers.

IF You Are a MONCRIEF DEALER . . .

...You Enjoy These Great Advantages

1 New Low Prices. A big help in closing immediate business, before any possible price advance.

2 The Moncrief Special Finance Plan. Three years for the customer to pay, but you get yours at once.

3 The same high quality that has always distinguished the Moncrief Line.

4 A complete line: Moncrief Furnaces and Air Conditioning Systems of every type and size for every home need.

5 Moncrief Engineering Service to help plan and estimate.

6 Moncrief Sales promotion material, attractive and convincing.

7 Moncrief Service: Sales offices and warehouses at convenient points.

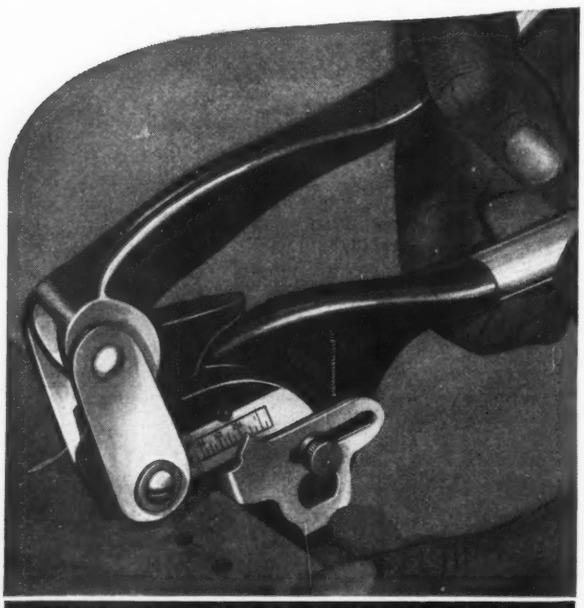
Plan to make 1936 a banner year. Begin by getting the details of the Moncrief Proposition. Write today.

The Henry Furnace & Foundry Co.
3473 E. 49th St. Cleveland, Ohio

◆

Manufacturer of

MONCRIEF
Furnaces and
Air Conditioning Systems



HYRO No. O.X. METAL PUNCH OUTFIT

Most Powerful of its Size!

It's a Powerful Work-Saver, too

You can punch holes as large as 17/64 inch in metal up to 14 gauge with the Improved Hyro No. O.X. Metal Punch. And you can do it with ease! Yet this Tool is very convenient to carry and handle. It measures only 8 inches overall and weighs but 2⅝ pounds.

Think how often you could use this fine Punch . . . how much time and labor it would save you. In a short time it would return the small investment of $5.90 (F.O.B. N.Y.) which buys not only the long famous Hyro Metal Punch . . . but a set of 7 Punches and 7 Dies, fitted in a sturdy steel case.

In the last year over 8000 sheet metal workers have taken advantage of this big value. You can get yours from a nearby supply house, or by mailing the coupon below.

$5.90 (F.O.B. N.Y.)
Buys this Complete Outfit

PRODUCT OF

PARKER-KALON CORPORATION

Parker-Kalon Corp., 200 Varick St., New York, N. Y.

Have nearest jobber ship me a HYRO No. O.X. Punch Outfit at the $5.90 (FOB, N. Y.) price.

Name.....

Address.....

Parker-Kalon Products Are Sold Only By Recognized Distributors

New Literature . . . .

For your convenience in obtaining copies of new Literature, use the coupon on page 77.

207—Register and Grille Catalog

Hart & Cooley Manufacturing Company, 61 West Kinzie Street, Chicago, Illinois, announce catalog No. 35AC covering air conditioning registers and grilles and containing much technical information of value to the air conditioning engineer. A particularly interesting section of the book covers the problem of air distribution with charts which make it a simple matter to select a grille of the proper type and size to insure proper air distribution according to the needs of the particular room. Of special interest to the forced air heating contractor is the amount of information furnished covering directional flow of air through grilles, including carrying capacities of various velocities, air deflection in all directions from the register and several important tables covering velocity and capacity relationship.

◆

208—Register Dealer Discount Sheet

United States Register Company, Battle Creek, Michigan, announce dealer discount sheet applying to catalogs No. 21 and 25, effective January 1, 1936. The price list contains base discounts and page references to the catalogs mentioned above for all the types of register, cold air faces, ventilating registers and air conditioning registers manufactured by the company. The price list also covers the company's special lines of grilles, screens, caps, dampers, clips, etc.

◆

209—Revised Register Price List

The Independent Register Company, 3747 East 93rd Street, Cleveland, Ohio, announce a revised price list, effective January 1, 1936. As in former price lists, complete tabular matter is presented on all of the company's registers for gravity heating, forced air heating and air conditioning. Register items are arranged by size and finish, accompanied by prices for all types.

◆

210—Damper Regulators

A small leaflet is announced by Ohio Products Company, 17606 Milburn Avenue, Cleveland, Ohio, covering Apex damper regulators and deflector damper parts. The line consists of pressed steel, cadmium plated, damper regulators and bearings for round and square pipes in several sizes and types. The leaflet shows each type and gives brief information on the design and operation. One page is devoted to deflector damper parts for various sizes of damper shafts.

◆

211—Pipe and Fittings Price List

F. Meyer & Bro. Company, Peoria, Illinois, announce a revised price list to catalog No. 49. Changes in prices were effective January 1, 1936. The complete line of double wall stacks, round pipe and fittings, register boxes, double fittings, cold air shoes and single fittings are grouped and arranged by size, catalog number and price.

◆

212—New Metal Worker Pattern Book

Scientific Book Corporation, 15 East 26th Street, New York City, announce a revised edition of Kittredge's New Metal Worker Pattern Book. The new edition is several pages larger than the previous issue and the publishers announce that six entirely new problems have been added to the previous work. These new problems deal with ventilation and duct work and develop patterns by the triangulation method. A number of changes have been made in old patterns and problems and parts of the original book have been rewritten and reset.

With The Manufacturers . .

Furblo Plans for 1936

The Furblo Co., Hermansville, Mich., announce that 1935 finished up with a very satisfactory showing and the company already in 1936 received orders for more than their total sales of 1933.

Plans are being formulated for a very vigorous campaign in 1936. The Winter Profit program will be pushed to the limit. Trade paper advertising will be carried in the following publications: American Artisan, National Sheet Metal Contractor, Sheet Metal Worker, Snips. The advertising will be consistent with moderate space.

In addition a full time general representative, whose job will be to assist dealers, has been appointed in the person of Arthur R. Meiche of Chicago, the oldest man on the Furblo staff in point of continuous service. Mr. Meiche will be kept quite busy until the middle of February attending National and State Conventions. After that, it is intended that he should visit each sales representative in his territory, get acquainted and outline plans for the year.

◆

Welding School in Cleveland

Twenty-six engineers from 8 states and 2 foreign countries, concerned with the arc welding of everything from plows to locomotives, are back at their duties packed with cost-cutting ideas after five days in lecture room and laboratory at the December session of the special welding engineering course offered each month jointly by John Huntington Polytechnic Institute and The Lincoln Electric Company, Cleveland, Ohio.

Under the tutelage of E. W. P. Smith, Welding Engneering Department, John Huntington Polytechnic Institute, Wilmer Stine, Research Engineer, Lincoln Electric, Prof. Fred L. Plummer, Case School of Applied Science, and Arthur Madson, Welding Instructor, The Lincoln Electric Company, the engineers received a comprehensive picture of arc welding design and practice.

◆

General Motors Enters Field

General Motors Corporation plans a program of expansion into the air conditioning industry, and has organized a new company for the marketing of year-round air conditioning and automatic heating products.

The new company will be known as Delco-Frigidaire Conditioning Corporation. Its general headquarters will be in Dayton, Ohio.

◆

Lau Appoints Representatives

Lau Heating Service, Inc., 954 East Monument Avenue, Dayton, Ohio, announce the appointment of the following representatives in their respective territories: for the Pacific Coast, L. W. Swigert, 1912 21st Ave., N., Seattle, Washington; for the New England district, The Widger Miller Corp., 614 Memorial Drive, Boston, (Cambridge), Mass.; for the Philadelphia district, A. Corbman, Ellsworth St. at 21st, Philadelphia, Pa.

◆

H. & C. Announces Price Reduction

Hart & Cooley Manufacturing Co., 61 W. Kinzie St., Chicago, have announced new low prices on their line of damper regulator sets and parts. At the same time they are announcing that their complete damper regulator sets, No. 70¼ and No. 70⅜ are now being packaged in new individual packages.

◆

Osborn Holds Sales Meeting

The annual sales meeting of the Cleveland division of J. M. & L. A. Osborn Company was held January 2 and 3. The complete sales force was in attendance.

John Flanagan, President, National Mfg. Corp., Tonawanda, N. Y., spoke on roofings and their merchandising. A. W. Howe, President of J. M. & L. A. Osborn Co., talked on General Business Conditions. C. A. Nenno, Executive V. Pres., conducted a sales clinic January 2.

HYRO UNXLD DAMPER QUADRANT SET

ALL the Parts in ONE box!

Saves Time on Damper Control Jobs

Hyro Damper Controls, favored by sheet metal workers everywhere, now come in handy "complete set" packages. Everything needed for a damper control job is included to save you the time and bother of getting together all of the different parts. You'll appreciate this convenience, and you pay nothing extra for it.

Your supply house will furnish the Hyro Sets in the sizes you wish. You can obtain either the UNXLD Damper Quadrant, long known as the standard and best control device; or the Hyro Dial Damper Regulator which is inexpensive but thoroughly efficient. Included with both are the necessary Damper Bearings, correct size Parker-Kalon Sheet Metal Screws for fastening the control to the duct, and the rivets for attaching Bearings to damper.

Send the coupon for Hyro Damper Control circular.

Inexpensive Hyro Dial Damper Regulator Set

PRODUCT OF

PARKER-KALON CORPORATION

Parker-Kalon Corp., 200 Varick St., New York, N. Y.
Send me your circular on HYRO Damper Control Sets and HYRO Accessories.
Name.....
Address.....

Parker-Kalon Products Are Sold Only By Recognized Distributors

The Indiana Convention

(Continued from page 56)

where unfavorable legislation had been killed before passage and explained how the Chicago associations had secured the co-operation of Council members who proved to be of a great deal of help in advising associations of pending legislation.

Elmer R. Mullin, Indianapolis, speaking on the subject "Estimating" declared that an exchange of costs might prove highly beneficial to the contractor who does not pay too much attention to his cost figures. The speaker cited the instance of a $50.00 job having approximately $35.00 of material and $15.00 of labor where submitted bids varied so widely that it was plainly evident some contractors were simply trying to get the job and paying no attention to their actual costs. The speaker suggested that overhead cost be checked year by year to determine the general trend of cost in the shop and in the field. In answer to a question, the speaker suggested that insurance, rent, telephone, light, gas, truck operation, taxes, etc., were all items for overhead. He also declared that the largest item of overhead is usually non-productive labor and recommended that cost breakdown be adopted so that estimating can be based upon actual cost rather than upon guesswork.

Merchandising

Mat Friedman, of National Sheet Metal Contractor, speaking on the subject of "Merchandising" declared merchandising is not new, but is as old as business transactions. "Merchandising should be the plan whereby a product or a service is made available to the buyer and under which a satisfactory sale is made for the buyer and a profit made by the contractor." The speaker suggested that manufacturers generally have contributed largely to the available information on merchandising, but that too many contractors overlook this assistance and that in the merchandising plan from raw product to ultimate consumer the contractor is at present the weakest link.

The Furmets reported results of a contest covering best show windows, signs, novelties, etc. Charles L. Gatz, Gary, Indiana, was awarded first prize for the best show window. Midwest Heating Company, Indianapolis, was declared winner of the contest for the best sign. J. R. Harris, Hammond, Indiana, won the contest for the best novelty, a sheet metal man on a sheet metal horse. Homer Selch, Indianapolis, with his tin shop-on-wheels, was declared winner of the best truck contest. Earl Smith, Flora, Indiana, with his excellent showroom of furnaces, ranges, washing machines, etc., was declared prize winner for the best showroom. The winners were awarded equipment or merchandise orders by manufacturers and the Capitol Furnace Supply, Indianapolis Machinery and Tanner & Company.

The Indiana Furmets entertained as graciously as formerly with an excellent floor show of Indiana talent.

With The Manufacturers . .

Armco Broadcasts A.S.H.V.E. Banquet

One of the interesting features of the January 29 Armco radio broadcast was that portion of the program in which John Howatt, president of the A.S.H.V.E., presiding at the banquet of the A.S.H.V.E. convention collaborated with Ironmaster Bennett Chapple, to give the radio audience first-hand information of the air conditioning industry and its big show in Chicago.

In answer to Mr. Chapple's question—"Just how big is this air conditioning industry?"—President Howatt said, "Air Conditioning is as old as life itself. Air conditioning marks man's latest mastery of the elements and through it he is able to provide for his convenience and comfort any inside weather condition of any desired temperature, humidity, purity or air motion. Air conditioning is used in industry and manufacturing processes and in the maintenance of human comfort and health. Our next step will be further research through co-operative efforts of engineering and medical professions to learn more of the relationship between air environment and health."

To which the Ironmaster replied: "For years we have been putting our furnaces in the basement so that warm air could rise of its own volition. Now through the science of forced air heating and air conditioning, we can place the furnace wherever we wish and be sure that comfortable temperatures will be maintained irregardless of outside temperature or wind direction and velocity. Air conditioning as a guardian of health and comfort seems likely to take its place as one of the most remarkable conveniences of modern times."

◆

James A. Trane Dies

James A. Trane, for many years prominent manufacturer of heating specialties and Vice-President of the Trane Company, of La Crosse, Wisconsin, died in Los Angeles, California, January 24. He had been in ill health for a number of years and death was attributed to a weakened heart condition.

Mr. Trane was one of the pioneers in modern heating, beginning his career in a tiny plumbing shop in 1886.

◆

Ingels Gives Stag Steak Dinner

J. J. Ingels, president, Ingels Elbow Machine Corporation, held a stag elk dinner on January 28 for about 160 persons representing 39 states in the country. The elk, which constituted the main course of the dinner, was shot by Jack Wooster, Sales Manager of the Ingels Company in Hellroaring, Montana and was shipped back to Chicago for this particular gathering. In addition to the dinner, music and entertainment was furnished and guests were afforded an opportunity to see the new Ingels machine in operation.

◆

Thomas & Armstrong to New Quarters

The Thomas & Armstrong plant, which has been located for years in London, Ohio, has been moved and made a part of Lamneck Products, Inc., in Columbus. The interests of the two companies being so closely parallel, it seemed extremely wise to move these two plants into one location where duplication of facilities was avoided. The new address is 416 Dublin Avenue, Columbus, Ohio, and the activities of Thomas & Armstrong will be continued as the Thomas & Armstrong Division of Lamneck Products, Inc.

◆

Robinson Furnace Appoints Stowell

Robinson Furnace Co., 213 W. Austin Ave., Chicago, announce the formulation of broad and aggressive policies of action for the purpose of getting its share of business.

With the above in mind, they are pleased to announce the association with the Robinson Furnace Company of Jack Stowell as general manager, who in accordance with the policies laid down by them shall have supervision of all activities and operations of the business.

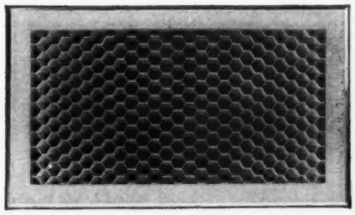
IN AIR CONDITIONING

Why Take a Chance?

on
- COLD-SPOTS
- STRATIFICATION
- LACK OF UNIFORMITY IN ROOM TEMPERATURE
- TURBULENCE
- NOISE

By Improper Selection of Registers

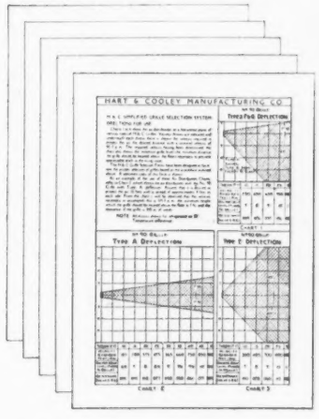
It's so Easy to DEFINITELY ASSURE Desired Results Under All Conditions

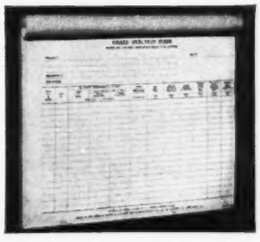


WITH H & C DIRECTIONAL GRILLES and REGISTERS

The unique construction of the No. 90 Directional Grille insures perfect control of air flow in any desired direction and reduces resistance, turbulence, and noise to a very minimum. These characteristics result in a uniform room temperature and in the absence of drafts and stratification, as has been conclusively proven in thousands of installations. To be sure of obtaining satisfactory results from your installations, decide first, to use H & C Air Conditioning Grilles and Registers. Then, by means of the H & C Grille Selection System, select the specific type and size of grille.

The H & C SIMPLIFIED SELECTION SYSTEM





Charts give complete information on air spread, velocity required for various throws, minimum grille level required, resistance, and correct size of grille—all very carefully worked out by air conditioning experts, and in easily understandable form.

Grille Selection Forms and a copy of the new No. 35 A C Air Conditioning Register & Grille Catalog, complete with charts, are available, free of charge, upon request.

HART & COOLEY MANUFACTURING CO.

Warm Air Registers H&C Air Conditioning Grilles
Regulator Sets Dampers · Chain

61 W. KINZIE ST. · CHICAGO · ILLINOIS

COPPER ROOFS

with KENMAR *Shingles*

Open the door to new sales for you!

OUR advertising is telling the public that *entire roofs* of Copper are now practical, economical, and attractive for *any pitched*-roof—with Kenmar Shingles.

We Play Ball with You

All prospects for Kenmar Shingles are referred by us to Sheet Metal and Roofing Contractors. And we are getting hundreds of inquiries—from home owners, architects, and others.

You Play Ball with Us— Extend Your Selling Field

Kenmar Shingles are patented. Are *not* subject to cut-throat competition. Jobs run into good figures. And a much wider range of metal roofing work is open to you, from homes to largest buildings — new building and re-roofing.

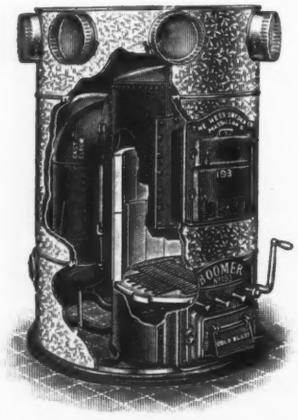
Let's go places together!

We furnish leads, sales helps, literature, and cooperate in every way with our contractor friends. Be the first in your territory to get in on Kenmar Copper Shingle business. Write today for complete information.

The New Haven Copper Co.

MANUFACTURERS OF SHEET COPPER SINCE 1849

Seymour, Conn.



Boomer Boiler Plate Furnaces

Also made with duplex grates and upright shaker.

Have been successfully made for 23 years. Where introduced have given satisfactory service. The fire pot liners are the best we can buy and we know of several Boomers that still have the original liners in, which are 23 years old. We have been making cast iron Boomers for 50 years.

If you are interested in selling a strictly high grade furnace, ask for prices and agency.

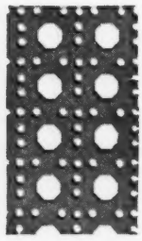
Nothing but the best of material enters into the making of Boomers.

When repairs are needed, avoid risk of dissatisfaction by ordering direct from the original patterns. Prices are low.

We sell to legitimate dealers only.

THE HESS-SNYDER CO., MFRS.
Massillon, Ohio

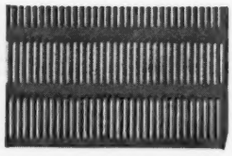
PERFORATED METALS



Screens for Grains, Minerals, Food Products or any material to be graded or screened.

Safety Guard Accessories, including perforated sheets, angles, bands, etc.

Architectural Grilles in many designs. Special patterns and sizes to suit your individual requirements.



Stainless Steel—Brass—Bronze — Copper—Monel—Aluminum —Zinc—or any other metal or sheet material perforated as wanted.

The Harrington & King PERFORATING CO.

5649 Fillmore St., Chicago, Ill. New York Office, 114 Liberty St.

UNIVERSAL BENDER. Simple to operate. Nothing to get out of order.
Capacity, ½"x2". Bends cold. Smallest square 3"x3" cube.

WHITNEY METAL TOOLS

Use Whitney tools in your shop. We manufacture a full line. Only a few of the many items can be shown in this advertisement.

RIVET SETS. Whitney rivet sets are drop-forged from the highest grade steel and designed to fill every requirement. Sold in 10 different sizes.

IMPERIAL ROLLER BEARING PUNCHES. Offered in 3 sizes. Will work inside 90 degrees. Quick changing for punches and dies. No cams to wear. Stripping positive.

RIVET PUNCHES & DIES. We can supply a complete assortment of rivet punches and dies from stock.

Good tools are essential to a profitable business. Make it a habit to use Whitney tools and to consult us on any tool problem.

WHITNEY METAL TOOL CO.
91 FORBES STREET ROCKFORD, ILLINOIS

FIRELINE

"It's the greatest stuff I've known..."

That's what a furnace *manufacturer* told us. As furnace expert on HOLC and FHA jobs in his territory he specifies that every job be firelined wherever a loan is allowed. As a furnace manufacturer he knows that FIRELINE provides the most permanent, most satisfactory means of repairing cracked or broken fire pots . . . that it protects *new* fire pots indefinitely . . . protects the interests of both the borrower and lender.

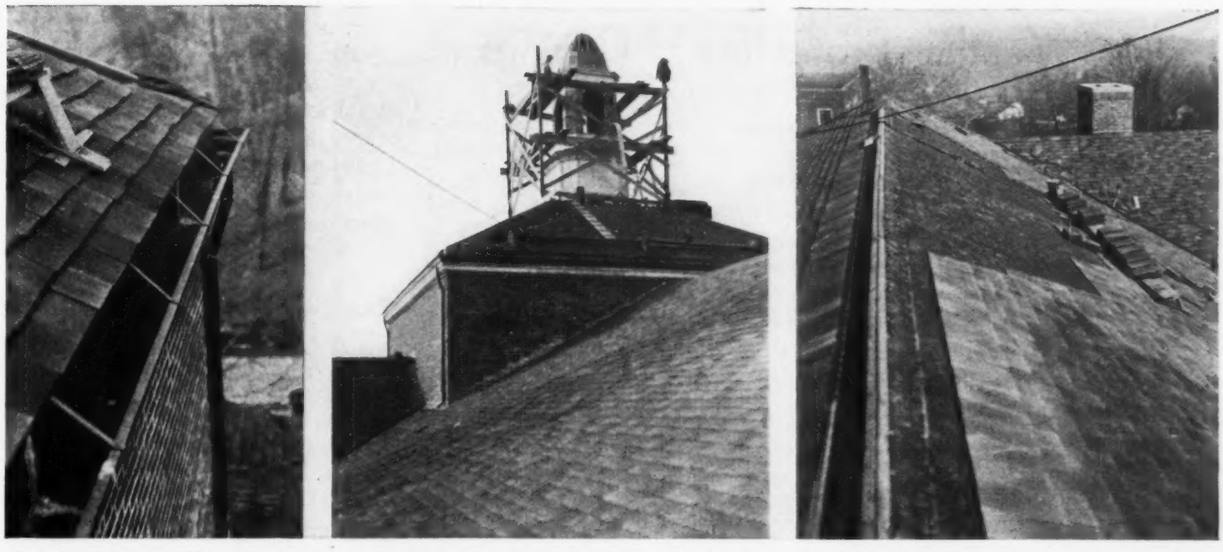
With FIRELINE you can repair *any* fire pot instantly at great saving to the home owner, and still make as much as $10 per hour for labor. You can increase the efficiency capacity of the furnace by eliminating smoke, soot and reducing ashes. Fireline ends the casting problem, the "orphan" furnace problem, and increases the market for your labor materially.

Write for Full Information and Free Sample

FIRELINE every new furnace — an extra profit for you and added years of service for your customer.

Fireline Stove & Furnace Lining Co.
1866-B Kingsbury St. CHICAGO, U. S. A.

© 1936, Pilbrico Jointless Firebrick Co.



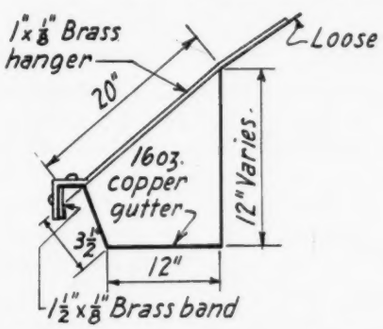
At the Left—Looking down a gutter showing hangers; Center—The tower ready for sheathing in copper; Right—Looking along the main roof ridge showing tile being laid from a scaffold.

Hiram College Copper Work

(*Continued from page 22*)

trucked from the Weenink shop.

The construction of the box gutters is shown in one of the details and in the photographs. The gutters were formed from a single sheet, turned around a heavy brass bar along the outside edge. The brass bar hangers are turned down over the outside face of the gutter and soldered at intervals along the top of the front face.



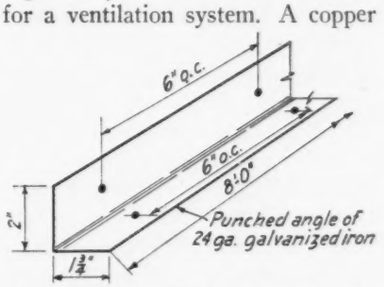
Detail showing gutter construction with stiffener bar and soldered hanger.

Every 34 feet a large expansion joint is set in the gutters. The joint consists of two butting triangular gutter ends capped with a loose locking cap which permits expansion or contraction.

Step flashing of standard construction is used around chimneys and the base of the tower. The valleys are left open and are formed from a 20-inch copper sheet. Copper water sheds having an 18-inch girth are used at all gable ends.

The tile used was laid on 30-pound felt, which, in turn, was nailed onto Nailcrete laid on the roof purlins. The color combination is varied purple and green. Entrance doors are flashed with e mbedded copper set into the wall 4 inches, some 2 inches above the frame.

False chimneys are used in the front of the building for architectural treatment. These chimneys are ingeniously used as exhaust hoods for a ventilation system. A copper screen at the top keeps foreign matter out while a copper pan on the inside catches rain water and drains it off through a 2-inch pipe running through the building.



Detail of one of the brick soap angles showing punched holes and dimensions.

Welding Light Gage Steel

(*Continued from page 15*)

by the surrounding air. However, there are also water cooled welding jigs used for certain types of work which produce very fine results. Work from a water cooled jig results in a smooth and even weld, free from distortion and excess metal. The construction of water cooled jigs is much the same as naturally cooled jigs except that they have water circulating through the cast-iron blocks which reduces the heat and keeps the jigs cool.

It is quite a problem to get the correct welding jigs for light gage steel such as 20 and 22 gage and it usually is profitable in the long run to have such jigs designed and made by some reliable tool company which is experienced in making jigs for oxyacetylene welding work.

It may be interesting to note that after every precaution and care has been taken to prevent distortion during welding, these food liners in some cases are put through a porcelain firing furnace of ordinary box type where the first coat or ground coat, as it is commonly called in the porcelain industry, is fired at 1250° F. Following this, the food liner is again put through the furnace and the first coat of white fired at a temperature of 1250 to 1400° F. When a second coat of white is required, it is put through again at 1250 to 1400° F.

Better Weather Protection — Copings

(*Continued from page* 20)

stone facing is not used the cap flashing should be turned down over the front face at least ½ of an inch.

Fig. 3 shows three recommended ways to through wall flash a coping of brick. Type A shows a continuous sheet which is stepped up a brick at a time. The chief objection to this type is that the flashing breaks the mortar bond clear through the wall and the top of the wall can be blown off. Plain, flat surfaced flashing is not recommended. Where this construction is specified one of the types of mechanical keyed flashings are recommended in order to obtain bond.

Type B provides a brick course mechanical key, although a complete mortar bond cleavage still exists. The chief difficulty is that part of the water is directed to the outside where it may stain the wall.

Detail C shows a better system in which the flashing is made in three separate pieces, placed in the wall as shown. Mortar bond is thereby retained, while a certain breakage of any continuous water passages is obtained with the metal. Details B and C are not recommended for main building walls where all moisture must be turned toward the outside.

Fig. 4 shows a method for flashing a low coping with a deck behind. The junction of the coping wall and the roof must be flashed completely because it is difficult to prevent driving rains from penetrating such walls. A reglet in the stone is recommended with the metal caulked with lead and a continuous sheet carried across the top of the stone and down the back side where the sheet forms the cap for a two-piece flashing assembly.

Coping Caps

Oftentimes coping walls are left uncovered. Water enters the mortar seams and may find channels down through the masonry. The contractor can remedy such penetration by placing a wood cap as shown in Fig. 5 the full width (or wider, see Fig. 8) of the wall. The wood is anchored as shown. Then a continuous metal cap, made up as shown, is applied in convenient lengths.

Cap in Mortar

Fig. 6 shows an alternate method where the brick is flushed with a sloping layer of mortar and the metal is formed to make a tight cap over the mortar. The metal cap should be pressed down into the mortar to get bond. Practice suggests that metal straps as shown should be riveted to the cap sheet at about 2 foot intervals. After the mortar has set the straps can be nailed into the front face masonry and either nailed into the brick work or soldered to a siding section on the back face. These straps provide secure holddowns for the metal cap.

Fig. 7 shows a coping flashing which was developed and has been used for many years by contractors throughout New England on factory buildings where heavy snows and driving rains make absolute protection necessary.

Where walls are less than 2 feet high, base flashing of the roof should be made integral with the wall siding or locked above the water line. The siding, in turn, is carried up to the top of the masonry behind the coping cap, as illustrated. Copper straps riveted or soldered to the cap are soldered to the siding. The same straps are used along the outside face and nailed to keep the cap on tight. The cap should be sloped to the rear and pressed down into the mortar.

High Parapet

Fig. 8 shows two alternate constructions for a parapet wall more than 24 inches high. A wood cap is suggested, formed as shown, and bolted into the middle mortar joint of the wall. If the wood block cannot be made wider than the wall the metal cap can be bolted through the wood as shown and turned out inside and back into large, square drips or moldings. Such screw or bolt heads should be soldered water tight.

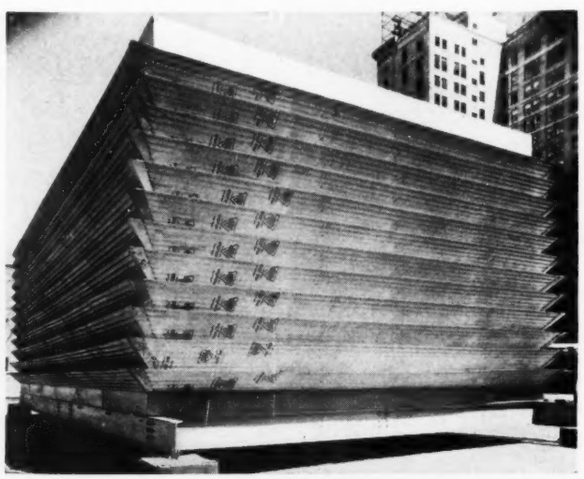
The alternative method is recommended. Here the wood cap is made wider than the masonry and the metal cap is cut to fit down and beneath the wood where it forms drips and nailing channels.

Atmospheric Cooling Tower For Cooling System

THE illustration shows an atmospheric type spray tower designed and installed by the Refrigerating & Atmospheric Correction Company for the Allen Theatre, 1497 Euclid Avenue, Cleveland, Ohio, for cooling water in connection with a mechanical cooling system. Its operation is very simple, mechanically. The water is delivered by pumps from the condensers to a series of nozzles distributed inside the tower. The water is sprayed upward in a fine mist from about half the tower height where it falls back, spreading over surfaces of slatted decks set below the sprays.

Cleveland safety codes required construction to be of fire resisting materials. About two and one-half tons of galvanized corrugated iron were used to construct the louvres and the framework.

The Allen Theatre, which seats about three thousand people, requires two hundred and twenty-five tons of refrigeration per hour. The tower cools nine hundred gallons of water per minute to within 5 degrees of wet bulb temperature of atmosphere.



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The user of perforated metals can see samples of designs and finishes, discuss the advantages of each for his purpose and give his instructions to our representative . . . personally. If our local man has not called, write us and we will see that he visits you. The folder WISSCO DECORATIVE PERFORATED METALS tells about new designs that offer better concealment and more air space. Send for a free copy.

WICKWIRE SPENCER STEEL COMPANY
41 East 42nd St., New York

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WICKWIRE SPENCER perforated metals

FOR 78 YEARS

The name of OSBORN has been a symbol of quality and integrity in the metal industry. A dependable source of supply.

THE J. M. & L. A.
OSBORN Co
Manufacturers—Distributors
DETROIT-CLEVELAND-BUFFALO

WHITNEY LEVER PUNCHES

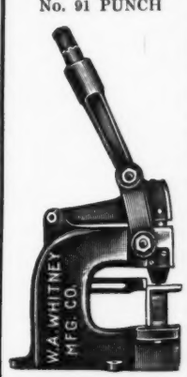
No. 4B PUNCH

Length—8½ inches. Capacity ¼-inch through 16 gauge. Deep Throat—2 inches. Weight—3 pounds. Punches and Dies—⅛" to ⅝" by 64ths.

No. 6 PUNCH

Length — 26½ inches. Capacity — ¼-inch hole through ⅝-inch iron; especially adapted for button punching or templet work. Punches and dies ⅛" to ⅝" by 32nds.

No. 91 PUNCH

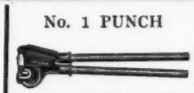


Capacity — ⅝-inch hole through ¼-inch, 1-inch hole through ⅜-inch and 2-inch hole through ⅛-inch iron. Depth throat 5-inches. Weight—82 lbs.

We have tools for every purpose needed by Sheet Metal Contractors.

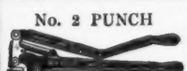
Ask your Jobber

No. 1 PUNCH



Length — 34 inches. Capacity — ⅜-inch hole through ¼-inch iron. Punches and dies in sizes from ⅛ to ⅝ by 64ths.

No. 2 PUNCH



Length — 23 inches. Capacity — ⅜-inch hole through ¼-inch iron. Punches and dies in sizes ⅜-inch to ½-inch by 64ths.

CHANNEL IRON PUNCH

Companion to No. 2 Punch. Every part of the two Punches Interchangeable, including punches and dies. Capacity—¼-inch hole through ¼-inch iron.

W. A. WHITNEY MFG. CO.
636 RACE ST. ROCKFORD, ILL

"370 SPECIAL"
RED OXIDE ROOF PAINT

The Standard of Quality

Sold only through recognized Sheet Metal Jobbers

Lyon, Conklin & Co., Inc., Baltimore & Washington
Stichter Hardware Co., Reading, Penna.
The J. M. & L. A. Osborn Co., Cleveland, Detroit, Buffalo
Rockford Sheet Steel Co., Rockford, Ill.
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Herr & Co., Lancaster, Penna.
Follansbee Brothers Co., Pittsburgh, Pa., Rochester, N. Y.
Eagle Roofing and Art Metal Works, Tampa, Fla.
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Manufactured by

THOMPSON & COMPANY
Since 1847

P. O. BOX 6757 PITTSBURGH, PA.

The National Warm Air Meeting

(*Continued from page* 19)

5—The allotment of a definite amount of money for advertising and sales expense.

Coal Research

R. A. Sherman of the Battelle Memorial Institute, Columbus, Ohio, speaking on "The Bituminous Coal Industry's Program of Research in Domestic Heating," declared that coal is still our basic fuel and seems likely to always be. He outlined the program which the coal industry has set up to carry on research which will make all coal a satisfactory fuel. The speaker pointed out the rapid growth in use of stokers, particularly for domestic installation and showed views of the Coal Research Laboratory where tests are under way on various types of stokers and fuels. The Coal Laboratory has disclosed that coals larger than 1½ inches are ordinarily crushed as they go through the stoker worm and further that segregation always occurs between the fine and coarse particles. Coals of ¾ inch maximum to 0 minimum show the least segregation.

Cooling-Heating Plant

Combination of a heating and cooling system, with a common duct system, will mean the sacrificing of the efficiency of one or the other, Platte Overton, consulting engineer, asserted in his address.

"The efficiency and proper design of the heating system cannot be sacrificed to include cooling," Mr. Overton declared.

The speaker said he was convinced that the two systems, indirect heating and cooling, are diametrical in general design, volume of air, location of inlets, controls, and many other items.

"To begin with, the modern cooling system in the average home, I believe, is in the future. It would be all very simple if I were to say that all one needed to do was to design a mechanical system of heating with one or more inlets in each room, in connection with one or more returns from the same room and simply blow in cold air in summer and warm air in the winter.

Proportion of Air Volume

"In the next few years, hundreds of thousands of homes will be built. These people are going to move out of hotels, flats, apartments, and old homes now adequately heated with direct radiation. We must give them what they have had — steady heat, warm walls, no cold 70, plus air cleaning, the proper humidity, elimination of radiators—at least where they can be seen or are in the way—and automatic heating.

"Manufacturers, engineers, and contractors must realize that there is more to the problem than just blowing warm air into a room. This brings us back to the combination system. No doubt some cooling may be effected by using the warm air supply ducts to carry cool air into the room, but contractors should be careful what they guarantee.

Mr. Overton went on to describe experiments on the experimental house built by the Chicago Evening American. It is forced-air heated, and the furnace is oil-fired, with an intermittent gun-type burner. The system in general is of conventional type, with twin blowers, filters, humidifier, and bonnet control of blower, trunk line, and branches.

The home's heating system, Mr. Overton said, has proved a success. Experiments with the cooling system will not be completed until the end of the coming summer.

"The cooling system consists of a 1½-ton compressor and the cooling coils are located in one of the return ducts on the suction side of the fan. Only one room is being cooled, the living room, and it requires ¾ ton of refrigeration at the peak load. A series of dampers were so installed that it is possible to switch the cooling from the living room to the master bedroom on the second floor.

"We chose a 1½-ton compressor in an effort to see just what degree of comfort cooling could be maintained in the entire house. It has been maintained or assumed that for the average home, a 3-hp. load is all that is practical, 1½ hp. for the lights, toaster, iron, washing machine, oil burner, fan, and so forth, leaving 1½ hp. for the cooling load. If we take this as a maximum of the power practical to install, we must fight the remaining load with insulation, double windows, awnings, and vestibules. The peak load, of course, is in the daytime with the full sun effect.

"On this particular installation we are attempting to use the same ducts and air inlets for both heating and cooling. The success of this remains to be seen. The returns from the living room are taken at the floor and ceiling line, those at the ceiling being used as returns for cooling, the system is figured for 100 per cent recirculation, but an outside air supply is provided, and we are trying an interesting stunt in connection with outside air supply.

Location of Air Inlets

"The air inlets in this living room are under or below the large windows facing the west. This is ideal for heating, but not so good for cooling if the present engineering standards are to be relied on. The registers are designed to deflect the air upward at an angle of 45 degrees.

"Air volume to the living room and the master bedroom is proportioned about 15 to five for heating and 12 for cooling. The ducts for this section were designed larger than for the balance of the house. The blower will not be speeded up for cooling but the balance of the rooms will be cut off by dampers and the entire air delivery will be directed to this living room, with dampers to divert it to the master bedroom if desired.

Use of Cooling Water

"The cooling water to the shell and tube condenser may be wasted, or through a hose connection, may be carried out to a lawn sprinkler. The evaporator or coils are laid flat over a pan, where any accumulated condensation may drip. This condensation is carried to the floor drain in the basement."

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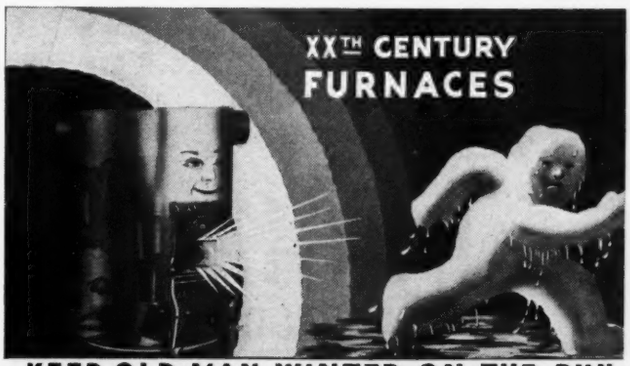

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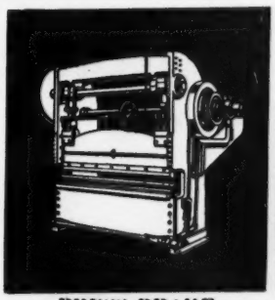

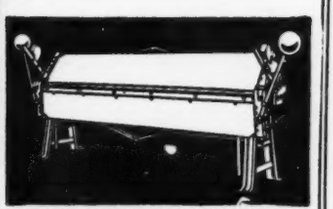

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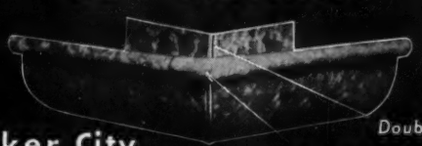

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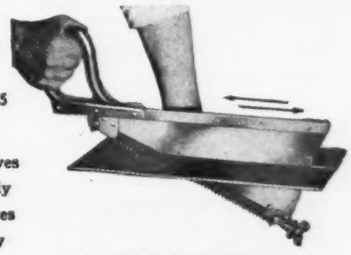

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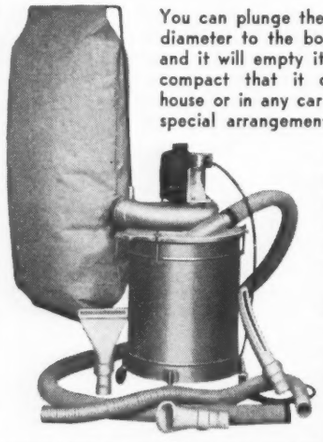

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GENUINE ETHIOPIAN LEOPARD

Photo: N. B. Ackerman

FROM faraway Ethiopia came the leopard skin to make this coat, the delight of its owner, the admiration of all beholders. There are so-called "leopard's skin" coats made of rabbit skins but it does not take an expert to recognize the genuine.

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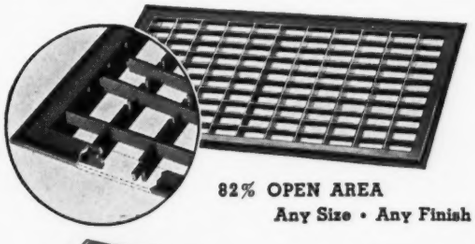

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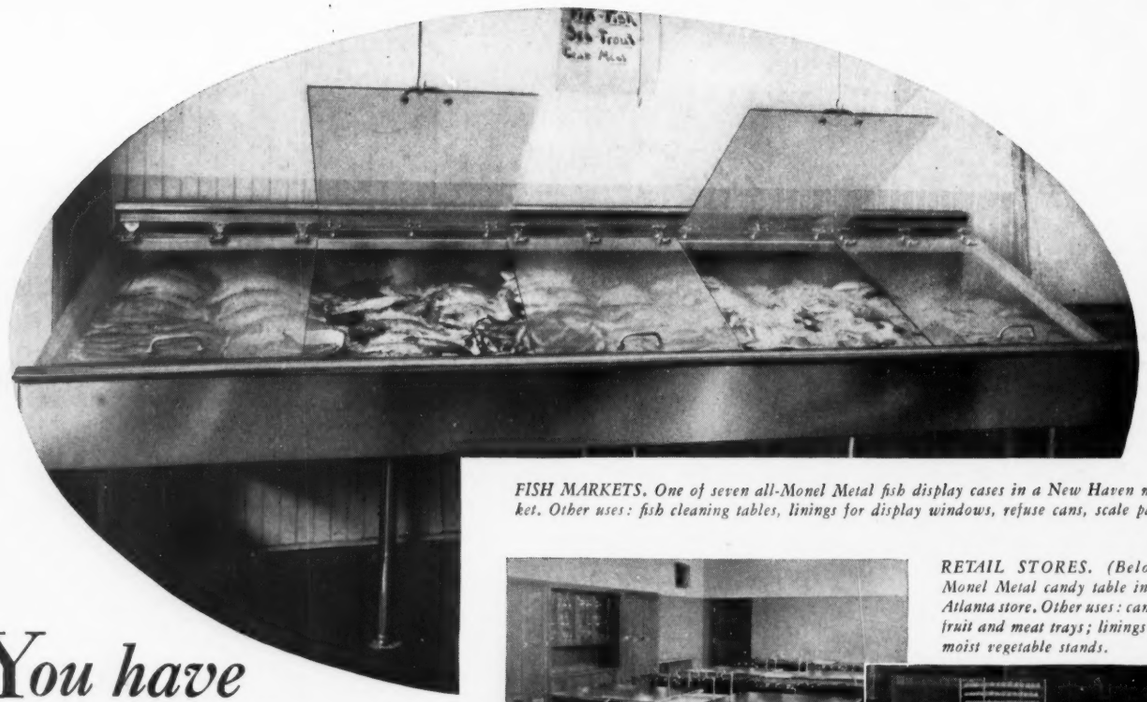

FISH MARKETS. One of seven all-Monel Metal fish display cases in a New Haven market. Other uses: fish cleaning tables, linings for display windows, refuse cans, scale pans.

You have NEIGHBORS... MANY *with jobs like* THESE

Check up among the hospitals, stores, markets, schools, laundries, restaurants and hotels right around you ... you'll land plenty of orders for equipment of Monel Metal

PUT on your hat and coat right now and do a little footwork. You don't need to do a lot of talking. Just explain that Monel Metal is good-looking, cannot rust, resists corrosion, stands hard wear, and is easy to clean. Also tell every man you call on that *you* can turn out a good, workmanlike job. You *can*, you know, because Monel Metal is easy to fabricate. Write us for clear, brief, easy-to-understand working instructions. Address:

The INTERNATIONAL NICKEL COMPANY, INC.
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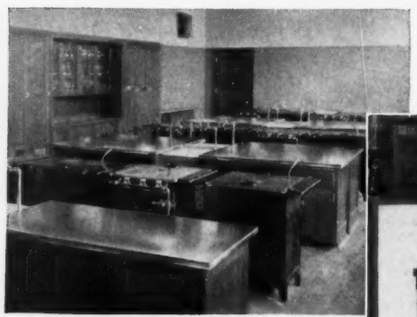
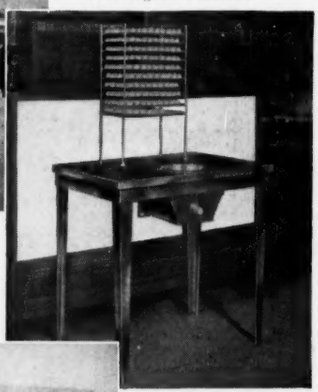
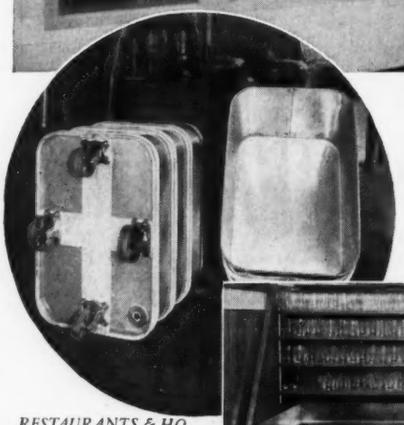


RETAIL STORES. (Below) Monel Metal candy table in an Atlanta store. Other uses: candy, fruit and meat trays; linings for moist vegetable stands.

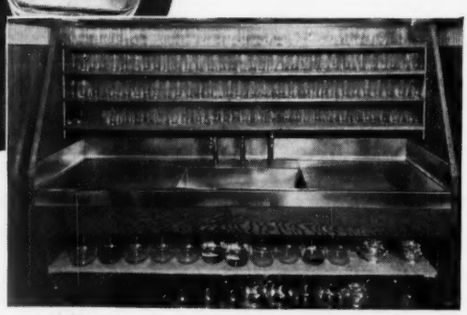


SCHOOLS. (Above) Domestic Science classroom tables covered with Monel Metal, in a Seattle High School. Other uses: flower boxes and trays, laboratory table tops, miscellaneous sheet metal jobs in cafeterias.

HOSPITALS. (Left) Monel Metal dumbwaiters in a Philadelphia Hospital. Other uses for Monel Metal in hospitals include: laundry chutes, food boxes, push plates on doors, laundry trucks, work and utility tables in the kitchen.



LAUNDRIES. (Left) Laundry trucks lined with Monel Metal in a linen supply company in Chicago. Other Monel Metal uses: gravity chutes, starching tables, measures and sorting tables.



RESTAURANTS & HOTELS. (Right) Custom built sink for washing glasses in a Canadian restaurant. Other uses: cooks' tables, dish-washing, range and oven hoods, water dispensers.